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Chemical Corps Journal

OFFICIAL PUBLICATION OF THE CHEMICAL CORPS ASSOCIATION
Room 206, Burton Bldg., 928 5th St. N.W.
Washington 1, D. C.
Lt. Col. HAROLD B. RODIER, *CmlC, Ret.*, Editor

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THE PICTURE ON THE COVER

Reelected President of the Chemical Corps Association, Ludlow King was selected by your Editor as the subject for the cover picture of this issue. The Journal salutes President King as a clear-thinking, hard-working and ever-enthusiastic leader.

". . . to sponsor new developments designed to increase the efficiency of chemical warfare means, to collect and disseminate useful knowledge with respect to chemical warfare and related subjects, to foster a spirit of good will and cooperative endeavor among its members and with industry, and to perpetuate the friendships, memories and traditions growing out of their service with the Chemical Corps . . ."

The Chemical Corps Association

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Washington, D. C.

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OUR ANNUAL MEETING

Since the Second Annual Meeting there has come to our Association a flood of letters, phone calls and personal messages paying high tribute to the quality of this meeting, and to the solid accomplishments of the Association in its first year of activity. Through all these messages, however, there echoed a note of caution. "The coming year," everyone has warned, "is the critical year. The Association must at least hold its own in activity and enthusiasm, and must grow in numerical strength if it is to maintain its validity and its power to accomplish its mission."

The coming year, then, must be a year of growth. Drawing into our ranks the large numbers of men who are eligible, and who can add strength to our purposes by their association with the organization, is a paramount task of our membership. Each of our members should contact his friends in the chemical industry who have not yet joined and urge them to affiliate. Such an effort on the part of our members would be a tremendous forward advance in the cause of National Defense.

And we would leave this thought with you: If every activity of our Association and its membership had as its total result merely the speeding up of our chemical mobilization in the event of a war by but a single day, this result would have repaid and made worthwhile a thousandfold, every bit of our labor and time.

CHAPTER ORGANIZATION

Chapters are constantly inquiring: "What can we do? We want to get busy and accomplish something worthwhile and would like suggestions from headquarters."

The first thing a Chapter should do is to get thoroughly organized. Name a full complement of committees. It is suggested that each Chapter should have an executive committee, a membership committee, a program committee, and committees on Research and Development, War Industrial Mobilization, and Military Education.

Hold frequent and worthwhile meetings. A program committee should have no difficulty in arranging meetings that will be worth attending, and such meetings will make the Chapter. Speakers of distinction and ability are always available; our National headquarters will be glad to cooperate in obtaining top rank speakers from the War Department when requested. Local industrialists will be glad to speak at well attended meetings, and good speakers assure a good attendance.

It might be well to consider how the cost to the individual of such meetings can be kept to a reasonable minimum. Many of the younger men are passing through a period of readjustment that makes it none too easy to pay four or five dollars for a dinner meeting. This situation is subject to much local variation, naturally.

But get your members in the Chapter, keep them interested, and remember that our Association does have a serious mission, and that your Chapter must be prepared to handle your obligations under this misssion, as they arise.

THE NATIONAL DEFENSE OF OUR NATION
Is Dependent Upon the
National Chemical Defense

* * *

The National Chemical Defense
IS STRONGER
Because of the Existence of the
CHEMICAL CORPS ASSOCIATION

* * *

The Chemical Corps Association
IS STRONGER
BECAUSE OF YOUR MEMBERSHIP

Objectives Ahead

By COL. LUDLOW KING
President, CCA

"It is difficult to realize that the Chemical Warfare Association is indeed little more than a year old, so active and effective has it been in assisting our national defense activities."—Lt. Gen. J. Lawton Collins, Director of Information. "The force and character developed by the Chemical Warfare Association in such a short period is amazing . . . the favorable impact and influence of your energies and activities will be felt for years to come . . . your continued growth and beneficial activities are of paramount interest to the Chemical Corps."—Maj. Gen. Alden H. Waitt, Chief, Chemical Corps.

Such verbal laurels bestowed upon your Association as it rounded its first lap are received with deep gratitude. However, in no manner do they provide justification for us even momentarily to relax on the oars. On the contrary, they are proof that our course is well chosen, our goals are straight ahead, and we must quicken our strokes to cover even greater distance than we attained the first year.

You are all acquainted with the general purposes and aims of the Chemical Corps Association as outlined in our Association Constitution. However, to create and maintain uniformity in our individual, chapter and national activities, let us take a kaleidoscopic view of some of the specific programs which we will support during our second year.

It is highly important that industry and our Army strengthen their grip of friendship, broaden their understanding of one another, develop sincere and sympathetic approaches to one another's problems, and in general form a bond of "blood kinship." As a means of enabling our Army to become better acquainted with industry, we will advocate the placing of Army personnel with industry. We will recommend that the War Department establish means whereby it can place intelligent, alert, and observing young Army officers deep within the inner mechanism of our great industries.

The practice of sending Army officers to colleges and universities for specialized training in engineering, chemistry, hydraulics and the like has long been established. This procedure has been perpetuated because it has proved to pay real dividends. During these academic courses the officers have few if any military duties. They dress and conduct themselves as other students, making maximum capital of their time absorbing the technical knowledge placed before them. Why not further broaden a percentage of young Army officers by giving them practical first-hand experience with industry? For example, place young Ordnance officers with General Motors for one, two or three years, where they can work in various phases of the production which will not only manufacture trucks and other vehicles for our Army during times of emergency but also during peace. Let these officers work as any other employee, performing the same tasks, working the same hours and drawing the same pay which is commensurate to the job performed. Their compensation will be handled similarly, only in opposite flow, as when industry permits its employees to receive military training by granting "military leave" (see following paragraph). The manner and means of placing Army personnel with industry should be worked out between industry and our Army in such a manner as to win industry's full approval, support and cooperation. At the same time the plan should assure the War Department that the officers will receive the type of experience which will be of great value to our Army.

Prior to World War II only an isolated few companies made special provisions for their employees to receive military training. Key personnel were generally married and had children. During the normal two weeks' vacation, they felt their first obligation was to their families and properly spent this period of relaxation and recreation with their wives and children. Many, fortunately, believed so strongly in the absolute necessity of military training that they spent their two weeks' vacation in an Army camp—but at the sacrifice of taking a vacation with their families. In order to increase the number and improve the calibre level of those employees receiving annual military training and education, we will continue to support the establishment of "military leave" by industry. It is obvious that circumstances peculiar to certain companies might prevent their granting "military leave," but in the great majority of cases it should be feasible. By "military leave" we mean the granting of at least two weeks to members of the National Guard, Officers Reserve, etc., for work with the Army. This time off would in no

(Continued on page 39)

Chemical Corps Association Celebrates Year of Progress at Edgewood

Election of Officers and Change of Name Opens Second Year of Association's Existence

Officers of the Chemical Corps Association elected at the Second Annual Meeting at Army Chemical Center on May 23rd

Left to right: Editor Harold B. Rodier, General Counsel Charles E. Pledger, Vice President Roy Kulp, President Ludlow King, Secretary-Treasurer Joseph Schwimer, Vice President E. Donald Rogers, Vice President Anthony D'Angelo, Vice President Harry A. Kuhn. Officers elected but not appearing in the group are Vice Presidents Alex Leggin, Clifford L. Sayre and Walter R. Kirner.

Attendance of above seven hundred at the second annual meeting of the Chemical Corps Association attested to the keen interest of our membership. Although the first scheduled event was on May 23, a considerable number came to Edgewood Arsenal on May 22 and an informal series of reunions of old friends enlivened that evening. Following registration on May 23, members were offered a choice of activities. Colonel Barker gave an informative and interesting talk on future developments in chemical warfare, which appears elsewhere in the *Journal*. Various tours of the industrial area, the Technical Command, and the medical laboratories were offered, as was a visit to the chlorine plant, through the courtesy of the Diamond Alkali Co. An article on the operation of this plant appears in this issue. Highlight of the annual meeting was the exhibit of German chemical equipment, a full account of which is also carried elsewhere in the *Journal*. In the afternoon a highly interesting chemical warfare demonstration attracted most of those attending the meeting. In the late afternoon a mixer, with suitable refreshments, afforded an opportunity for visiting old friends.

The dinner meeting was a brilliant success and did the host chapter great credit. President Ludlow King presided at the dinner and the principal speakers were Under Secretary of War Kenneth C. Royall, Maj. Gen. Alden C. Waitt, Chief of the Chemical Corps, and Mr. Harry L.

Derby, representing industry. Each speech was of great significance and is reported in full elsewhere in this issue.

Following the dinner a cabaret-style dance provided an enjoyable climax to the day.

The Directors-at-Large, the Directors and officers of the Association, however, were denied this pleasure as immediately following the dinner the annual meeting of the Directors was held at the Chemical Warfare School. At this meeting there was a full discussion of policies and plans for the Associaton, and the officers for the ensuing year were elected.

President Ludlow King was unanimously reelected for another term. Col. Harry A. Kuhn, USA, Ret., was elected First Vice-President. Reelected as Second Vice-President was R. Donald Rogers, Fiscal Division, OCCC, Chairman of the Finance Committee. Reelected as Third Vice-President was Anthony D'Angelo, Colonel, Cml. Res., Chairman of Membership and Organization. Elected as Fourth Vice-President was Alex Leggin, Lieutenant Colonel, Cml. Res., Chairman of Publications. Reelected as Fifth Vice-President was Roy Kulp, Edgewood Arsenal, Chairman of Meetings and Conventions. Elected as Sixth Vice-President was Dr. Walter R. Kirner, Chairman of Research and Development. Reelected as Seventh Vice-President was Clifford L. Sayre, Colonel, Cml. Res., Chairman of War Mobilization Planning. The Directors also unanimously voted to change the name of the Association to the Chemical Corps Association.

Following the Directors' meeting, at the meeting of the Executive Committee, Joseph Schwimer, Captain, Cml. Res., was reelected as Secretary-Treasurer. Charles E. Pledger, Jr., Major, Cml. Res., was reelected as General Counsel. Harold B. Rodier, Lieutenant Colonel, CC, Ret., was reelected as Editor of the *Journal* and the *News*.

On Saturday, May 24, the annual meeting of the Association was held in the auditorium of the Chemical Warfare School. Reports of all committees were received and are reported elsewhere in the *Journal*. A spirited discussion of the activities and affairs of the Association characterized the meeting. This brief resume of the annual meeting introduces the detailed articles, covering the various activities, which follow.

Don Rogers with Charlie Pledger and 900 others listen with attention as General Waitt tells the gathering of his hopes for the Corps.

Lt. Col. T. A. Carilia of Edgewood's Medical Division and Capt. D. Gravia of New Haven listen with interest to *Journal* and *News* Editor Lt. Col. Harold B. Rodier during the Association dinner meeting.

The Executive Committee, Chemical Corps Association, wishes to express its sincere thanks to the Diamond Alkali Company for opening its plant at the Army Chemical Center on May 23-24, for the benefit of the members and guests who attended the second annual meeting. The trip through the chlorine plant was handled in an expert manner and added to the success of the meeting.

A Tribute to the Corps

Address before Second Annual Meeting, Chemical Warfare Association, Edgewood Arsenal, May 23, 1947

By UNDER SECRETARY OF WAR KENNETH C. ROYALL

HON. KENNETH C. ROYALL
Under Secretary of War

The real thought which I wish to express tonight could be epitomized in one sentence: "The War Department as a whole, and my office in particular, realize and appreciate the splendid service rendered by the Chemical Warfare Service in World War II, and we recognize the importance of the future tasks of the Chemical Corps and have confidence in its ability to perform its tasks and to perform them well."

And when I go much more into detail—particularly in the technical field—I am likely to be like the speaker at the family reunion.

One reason why I do not adhere to the rule of succinctness is that brevity might be mistaken for lack of present interest in your work and your accomplishments. Such, of course, is not the case. One who knows your projects and what is being done on them will feel that your role in any future war and in preparation therefore is a leading role. I would like to speak briefly of one phase of that role—the scientific phase.

It is a sad commentary on civilization to say that World War II has demonstrated that rules of warfare mean little in total war—mean almost nothing to ambitious aggressors intent on oppression or world domination. Yet if we are realists, we know that such is the case. The records of the recent war crime trials contain overwhelming evidence that established codes of war conduct were violated at will by our enemies.

The only deterring factor in many situations was fear of reprisal—fear and uncertainty as to what we and our allies might be able to do if certain international agreements were violated. In no field was this better illustrated than in the field of toxic gas—a field where a feeling of humanity rather than a specific agreement was involved. Does any one here believe for a moment that either Germany or Japan would have hesitated to resort to gas warfare against our nation and our allies, if these enemies had not thought that we were better prepared for such warfare than they—better prepared in quantity and quality?

And so it will be in the future with new and more destructive weapons—whether it be gas or the atomic bomb or biological warfare or some other form of terrible devastation. It is more than obvious that until and unless our country can be sure that war is not a real possibility—or sure that, if war comes, we will be free from danger in any particular field of destruction—obvious that until such time, we must stay in the forefront of scientific research and progress and development of every conceivable type of offense and defense.

Our attitude toward atomic weapons well illustrates our nation's approach. We not only are willing—we are anxious—to abolish forever the use by any nation of atomic destruction—through bombs or by any other means. We sincerely feel that the use of such weapons in another war may bring the end of our present civilization. And we are proposing an international compact to abolish atomic warfare.

But we are insisting—and must continue to insist—that any such agreement be an enforceable one—implemented and supplemented by accurate information as to what other nations are doing or are preparing to do—reinforced by adequate inspection and checks. And in view of the present attitude now taken by another great country, we regretfully realize that we can do nothing but continue intensive study and prepa-

ration of improved atomic weapons—as well as defense against such weapons.

It is lamentable—indeed tragic—that the world must engage in a scientific contest of destruction. Such contest is the essence of wasted effort by many of the best brains of our nation who are spending valuable hours—and expending ingenuity and resourcefulness—in search of lethal weapons—and at the same time in search of a cancelling defense against those weapons—often just a treadmill.

Nor is this anomolous and deplorable situation sufficiently offset by the fact that war research and development often produces by-products of civilian value. Of course, we must make full use of these by-products in an effort to salvage some good from so much evil. But I am one of many who would, for example, willingly forego any peacetime benefits, no matter how great, that might be derived from smashing the atom, if I could at the same time erase from the minds of men any knowledge of how nuclear fission could produce human destruction.

But, unfortunately, we do not have this choice. We cannot today elect the course we would follow, because we cannot know—and cannot even hope with assurance—that potential enemies will follow the same course. Two world wars have again recorded what history has repeatedly proven over centuries—the fact that neither faith nor the doctrine of sweetness and light nor the submissive philosophy of the children's crusades—that none of these things will protect us from another nation bent on aggression.

We are earnestly, through the United Nations, seeking a way out of this disheartening dilemma. We will not, we must not, stop this quest no matter how discouraging it may seem at times. But we know today that we have not yet reached a point where we can forego national defense. At this hour we cannot dispense with preparedness against any possible type of warfare, no matter how cruel.

For the sake of our national safety we must stay ahead of the rest of the world in new development—new development of planes, ships, guns, bombs, gases, germs, weapons of all kinds. We must produce for our fighting men arms and ammunition that are well ahead of those of other nations both in time and in design—so that, no matter what the place or the environment or the circumstances, the military effectiveness of the American soldier will be as great as human ingenuity can make it.

In this contest of skill and brains and mechanical ability, we must take such solace as we can in the fact there will be some incidental civilian benefits. But we must and can take much more comfort in the thought that our possession of better weapons—and the knowledge or belief of other nations that we do have better weapons—will save the lives of American boys in any future war, as it saved such lives in World Wars I and II.

And there is another fair aspect of this otherwise gloomy picture of a spiralling race for arms and for scientific military development. Our preparation in these fields may well deter another way entirely. Even if any other nation could today stand the strain of another world conflict, I am confident that our present possession of better weapons and more deadly means of destruction would make any aggressor hesitate to precipitate such a conflict.

We must remain in that position—we must press our search for newer and better ways to substitute men for material and to help the many men for whom we can find no substitute. And we must remember that the time element is more important today than in the past. We have no assurance that in any future war we would again have two years—or even two months—to prepare and to produce.

Do not forget that in World War II no airplane was actually used by us in battle that was not well along in development *before* the war. If a future war should come, it will not be enough to be in the basic research stage of a weapon we plan to use. It may be enough to be in the applied research stage. It is possible—even probable—that whatever we plan to fight with must be largely developed before such war—developed and perhaps even ready, tested, tooled and partially in stock. We must today move ahead in science—and move rapidly.

To accomplish the best scientific results for the future, we must have a long-range program—with as much stability as possible. And the government must provide reasonable continuity of its own scientific staffs as well as continuity of programs. A "stop and go" method of research will not give us the ascendancy we want and need.

It is also important to broaden our scientific horizons by encouraging pursuit of research throughout our nation, particularly on the part of our younger citizens. In this way we can look for larger dividends in national development as a whole. A military development will inevitably share in those dividends if we correlate our Army and Navy research—as we should and will do—with the broader aspects of general research.

(Continued on page 41)

Chemical Corps—From War to Peace

General Waitt addresses dinner meeting

By MAJ. GEN. ALDEN H. WAITT
Chief of CC

This past year has been one of many changes for the Chemical Corps. We have gone a long way in converting our organization from a wartime to a peacetime agency. We have even changed our name. We are no longer the *Chemical Warfare Service*. We are *The Chemical Corps*.

It has been a difficult year for us because the business of contracting and at the same time trying to produce effectively is always harder than expanding. But we are trying, nevertheless, to produce as much light as heat in the process. It is never easy to know what can be safely left out without harm to the main objective. All our efforts have been to keep our thought on this main objective—to provide an effective and strong chemical defense for the Nation.

In some important fields in the postwar program we have made considerable progress during the past year and I am proud of our successes. But in others I feel we have barely managed to hold our ground.

I believe I can safely say that we have made exceptionally good progress during this past year in building a strong and effective research and development organization. It is not yet complete. We have a few key spots to fill, but we have been extremely fortunate in obtaining a great many outstanding scientists and technicians. We intend to keep them by every means possible.

At the same time, we have made progress in the development field. We have material leaving the drawing boards and being readied for proof testing. That shows we are getting our work done and putting it into the hands of our troops. You saw an example this afternoon in the new 4.2 mortar.

In our procurement planning, events of the past year have left us in a less satisfactory position than I had hoped. Insufficient personnel is one cause. In the process of retrenchment, our plans for maintenance, repair, and rehabilitation of wartime equipment have been affected. We have had to forgo an active educational order program which experience has shown to be extremely valuable to the technical service such as ours. In some cases we have found that detailed procurement plans must await further technical studies and development.

However, we have made a good record in the past year in termination of contracts and renegotiation work. Termination settlements of wartime contracts is 99.9 percent complete, and when all renegotiation of contracts was transferred to the general staff level recently, our work was 95 percent completed.

The training picture has both favorable and unfavorable aspects. The Chemical Corps School is going forward splendidly in the training of our new officers and in providing advanced training for our older officers.

I cannot pretend to be pleased with the progress during the past year in training our Chemical Corps Reserves. We have had difficulty in providing a program so necessary in maintaining enthusiasm, keeping interest alive.

However, I can assure you that the War Department, from the Chief of Staff down, is fully aware of the vital importance of the Reserve training problem. The problem is not simple. It takes time to establish sound overall reserve organization and training policies in line with new developments and trends in weapons and techniques. The Reserve training program is intimately linked with other major problems of the organization of the armed forces, equipment and mobilization planning, for which firm policies have not in all cases yet been established.

But certainly I am not pessimistic as to the ultimate success of the Army Reserve training program or of our own. We must and we will have a strong and enthusiastic Chemical Corps Reserve which will both conform with the needs and make the best use of the capabilities of all our reservists.

(Continued on page 42)

Address at the Annual Meeting of Chemical Warfare Association, Edgewood Arsenal

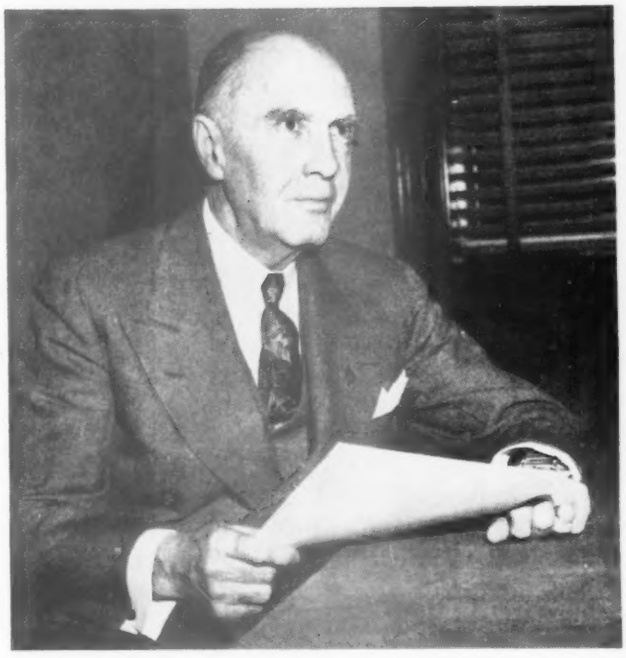
By H. L. DERBY

Your organization declares its recognition of the vital importance of Chemical Warfare in the field of National Defense. Its members have joined as a patriotic obligation. Its stated primary mission is to preserve the knowledge derived from war experiences and to encourage improvement in science, as applied to the Chemical Corps. The Association has for its objective the sponsoring of new developments designed to increase the efficiency of Chemical Warfare means, and to collect and disseminate useful knowledge with respect to Chemical Warfare and related subjects.

Early in 1937 the Secretary of War established the Chemical Advisory Committee of the Army and Navy Munitions Board and on that committee and its subcommittees were represented all of the leading manufacturers in the chemical industry. Each in his particular field supplied knowledge and experience, and cooperated with the Government agencies in making full preparation for the war that came to this country in a few short years. Thereafter, for the balance of the war, the industry also cooperated fully with the War Production Board and prominent representatives of chemical manufacturers served on its various committees.

Many industrialists were hesitant to accept the invitation to give wartime service on these committees inasmuch as the Department of Justice indicated the possibility of prosecution under the anti-trust laws. Upon appeal to President Roosevelt by the Chemical Advisory Committee, he addressed a letter to the various Government departments stating that the deliberations and records of the committee were not subject to subpoena or use by other Government agencies. The War Department extended additional protection by having the records and reports pass through the hands of Army or Navy officers who classified them as confidential military information.

I urgently suggest to the two distinguished speakers who have preceded me—Under Secretary of War Royall and Major General Waitt—that steps be taken toward consideration of new legislation which will make it possible to cooperate within industry in preparation for National Defense without the danger which would result from publication of confidential information. Legislation should also insure those who are giving such voluntary service against prosecution under the technical provisions of the anti-trust acts, for any action taken in cooperation with the Government on the problems of National Defense.



Mr. Harry L. Derby

In the chemical industry, which you all know is *one* of the leaders (if not *the* most important industry) for National Defense, we had the benefit of great developments between the First World War and 1938. Through research and employment of large amounts of capital, the chemical industry during that time had become fully rounded out and self-sufficient, and it is matter of record that there was never, at any time during hostilities, an actual shortage of chemicals required for front-line action or sustained operations.

In addition to greatly expanding privately-owned plants, nine chemical companies built and operated facilities with a value of $2,365,000,000 during the period from July 1940 to the latter part of 1944, according to figures of the War Production Board. While financing of these facilities was done by the Federal Government, the responsibility for construction and operation fell on the shoulders of industry.

I do not mention this to praise you for your patriotic service, but more particularly to form a background for what I am going to say as to the future security of the Nation.

This Association, formed by and with the backing of men of experience in chemical's important role in defense, has an obligation for the future which is not light. The next war will be won by that nation which has kept abreast of progress. Such a program entails endless research and development. If the tremendous development in the chemical industry is to be sustained, the necessarily large and expensive research programs cannot be conducted by individuals or, to any great extent, by small businesses, nor effectively by government. They must be carried out chiefly by those companies with large research facilities and whose financial budgets permit of spending the large sums required. It should not be understood from this that all of the important developments came from the laboratories of large corporations. Many of the outstanding chemical developments originated in small laboratories of industrial companies and of colleges. The National Industrial Conference Board is authority for the statement that 3.3 percent of the gross income of chemical companies is spent on research, with about 5 percent in organic and 2 percent in heavy chemical industries. This compares with .2 percent for all other industries.

The nature of the chemical industry being so highly competitive tends to prevent collaboration in research but no doubt promotes a wider exploration of the possibilities than would otherwise be true. This keen competition in the industry makes it necessary for this Association to organize and carry out its plans in order that NationalDefense may be adequately and completely coordinated. Discoveries made over the past 25 years have resulted from the efforts of tens of thousands of research chemists constantly at work exploring heretofore unknown possibilities. This is an insurance that the Nation will keep up with the progress of the world and it may reasonably be expected that American ingenuity will lead.

To those not familiar with our industry, it should be pointed out that chemistry plays an important part both in the processing of raw materials and in the manufacture of products wherein the raw material undergoes chemical change. This represents the largest single segment in the Nation's total manufacturing enterprises, even surpassing such basic industries as iron, steel and food. Over seventy basic industry groups are listed by the Department of Commerce as being served by the chemical industry. With a production output (in 1946) of over twenty-five billion dollars, the industry exceeds that of any other American group. There is hardly an article of commerce the production of which is not affected by some chemical.

American chemical industry is now engaged in a further program of expansion estimated to cost in excess of five hundred million dollars. Many, if not most of these plants, will be producers of products developed during and since World War No. 2. Many of these new products will supersede other less-effective chemicals. The industry is one of fast evolution and the intensive research frequently results in making obsolete a plant only recently constructed.

To a group such as this it is unnecessary to refer to the chemical war developments, improvement in explosives, development of the atomic bomb, synthetic rubber, high octane gas and other outstanding achievements which came from the research laboratories. During the last war un untold number of lives were saved by the new discoveries in drugs and medicinal products. Penicillin and the sulfa products were outstanding life-saving compounds and now streptomycin is available for some ills which do not respond to either of the two first-mentioned articles.

Before America entered the last world war it was called upon for huge quantities of raw materials and finished products to be supplied to England, France, Russia, and other Allied countries and, but for our production, Germany might easily have won the victory before the United States declared war.

I do not wish to create the impression that the chemical industry is the sole basis for National Defense and I am sure I will not be so misunderstood. American industry, with all its ramifications, mass production facilities and intelligent and efficient labor, forms a security which in these troublesome days is an asset possessed by no other nation on earth. It doesn't seem possible that with these facilities and resources we will fail to exercise the most powerful influence for peace in the world. There are some nations having greater manpower and unlimited sources of supplies of raw materials, but manpower and raw materials are not exclusively the resources for defense of a nation.

The outstanding record that the United States made in wartime production was possible only through the utilization of the tools and abilities which had been created in *peace*time under a private enterprise system.

In looking to the future, we must never dis-

(Continued on page 60)

Photo by Frank Randt

One of a series describing Cyanamid's many activities.

"You mean they won't sprout?"

"DO YOU mean to tell me that just by dusting or spraying potatoes with some new chemical you can keep them from sprouting in storage?"

That's right, mister. It not only keeps potatoes from sprouting but it also keeps them firm and fresh and "new" tasting for as long as a year after harvesting. It is a new material known chemically as a methyl ester of naphthalene acetic acid and developed commercially by American Cyanamid Company in cooperation with the Boyce Thompson Institute for Plant Research, Inc.

Now available and sold under the trade name of BARSPROUT* Sprout Inhibitor, it is easily applied to the newly harvested potatoes in the form of a dust. Thus potatoes harvested in the fall may be kept in storage until conditions are right for marketing...and the housewife can buy potatoes with a fresh, new flavor at any time of the year.

BARSPROUT has demonstrated its effectiveness on thousands of bushels of "spuds"...and is expected to save millions of bushels wasted annually because of adverse shipping difficulties and marketing conditions. It offers new opportunities to both growers and to manufacturers of potato products since its cost is low and a little goes a long way.

Recently tests have indicated that BARSPROUT also will control the sprouting of rutabagas, white turnips and carrots. Thus it offers still further promise of food conservation. BARSPROUT is another result of Cyanamid's chemical research and product development.

*TRADE-MARK

American
Cyanamid Company

30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y.

MOLDING THE FUTURE THROUGH CHEMISTRY

Science for Peace and National Security

By MAJ. GEN. ALDEN H. WAITT
Chief, Chemical Corps

This country has recently undergone a supreme test. It was a test, perhaps the first in a series of tests, to determine whether the Democratic form of government built upon the ideal of individual liberty could survive.

We saw the beginning of a new concept of war, that is, total war, which spares no one, man, woman or child, in the range of operations and demands the effort of everyone.

At the same time, we saw science come into its own on the battlefield and we have come to realize that our strength today and in the future lies in science, that our national security depends on science, industry and technology.

Science, having accomplished its mission in World War II, now has the further responsibiilty of leading the way toward peace. The biggest question that faces us today is how to win the peace. Every thinking man has some idea about how to do this or how it should not be done. Although we tried disarmament after the first World War, there are still many who believe we should disarm. At the same time, there are others who believe we should arm to the teeth and keep the peace by policing the world with the most powerful Army, Navy and Air Force that can be built.

I don't believe that big battalions or material power alone can win the peace for us in the long run, but I am sure that we cannot abandon these material means until our efforts to bring order and justice to the world have begun to bear fruit.

Most Americans feel that we are leading the way toward a system that will guarantee world peace and security for every man everywhere, regardless of race, creed or color. Freedoms exist here in America which exist nowhere else in the world and we want all peoples to enjoy the same freedoms. We and the other Democracies which stand for the freedom of the individual and the dignity of the human soul today hold the only practicable key for world peace. Therefore we must remain strong until our ideals can be worked out for the benefit of everyone.

Many of us are inclined to think internationally as world citizens. This is good. It is only by thinking as citizens of the world that we can ever reach the time when all peoples can live together without warring against each other. But we must have a nationalist attitude as well as an international attitude. We can't escape the fact that we are citizens of the world who are fortunate enough to live in the United States. We have a responsibility to our state which protects us as well as to the world.

Whether we like it or not, our nation has fallen heir to world leadership. Under our Democratic system this country has become the world's greatest power, envied by the rest of the world. We are all proud of our position in the world. We like being leaders and as Americans we hope to continue to lead.

A great part of the world is looking to us to provide that leadership which only we can give. I believe that if we do provide it, it will be followed eagerly. I wonder, however, if we realize that we shall have to pay a heavy price if we are to continue to maintain our position.

Are we really willing to pay that price? Do we understand that world leadership and world peace require the greatest sacrifices on our part? That we can't talk of reduced taxes? That we must share our abundance with other lesser favored nations in order to bring their peoples up to a state of comfort and security? That we may have to fight to enforce world justice? And do we understand that there is no going back a little way? That to drop back at all from our position of leadership means to drop back all the way to the status of secondary power?

If we are to have world peace, we must understand all these things; that it is vital we share our abundance with the rest of the world—that it is vital we make the sacrifices necessary and especially that we remain strong and just.

I am confident that world peace will come eventually and that it will come through advances in science. Although we can't win the peace with armies, we can keep the peace for a time by our strength because other nations may fear to attack us. To win the peace, however, causes of war must be removed, and here is where science can help.

More than anything else man desires security and happiness. The suspicions and fears of the peoples of the world today are caused largely by a feeling of insecurity. Peace is a natural state resulting from security and happiness. The important task of science is to determine and then to heal the underlying causes of discontent and unhappiness in the world. Is this task too great? Can it be accomplished? I believe it can.

Much hope lies in the provinces of social sciences—sociology, geopolitics, economics, psychol-

ogy—and in the political sciences. There are many fields for study and action. The effects of population pressures must be investigated and causes removed. Productivity everywhere must be increased by scientific methods. Science must find ways of overcoming famine and low subsistence areas of the world. These things are possible. They are within our reach right now.

There is need for the scientific point of view in politics. The true scientist is concerned only with the absolute truth, expediency has no part in his research. If he is to solve his problems, proved facts only must govern him in the laboratory.

There is much hope in the almost fantastic strides that the physical and biological sciences are making today. Science is opening up new paths for progress in chemistry, physics, biology which affect medicine, agriculture, industry—every phase of life. It is inevitable that through them the standard of living and the health of the world will be increased. It will take time, perhaps generations, but we are going forward rapidly.

I am a firm believer in the idea that "science operating in fields that know no national barriers can be a prime mover in bringing more unity to mankind." It has been suggested that world owned and operated laboratories be established in which scientists from every land work together to wrest new secrets from nature. I am not sure that we are ready for this, but I do believe we are ready to contribute our basic scientific information to the world. The United Nations Commission for the control of atomic energy has been assigned this very duty. The first term of reference for this commission requires that an effort be made to extend between all nations the exchange of basic scientific information for peaceful ends. Success in this program can have a greater long-range effect on world peace than even the successful control of atomic warfare.

The control of the atomic weapon, if it is possible, might prevent war temporarily through the threat of its use, but this threat of force must weaken as time goes on. Peace cannot be forced. It will come only when all men have reasonably equal privileges and opportunities to enjoy life. Science eventually will bring this about.

A free exchange of scientific information between the nations of the world will speed the process by gradually improving the conditions which are causing war. I think you will be glad to know our Army realizes this. As a result of our military research, we have gained a vast amount of valuable scientific information. We are making it public as rapidly as possible. It is the policy of the War Department to release to science and industry all of its research findings that can be released without injuring national security. The Chemical Corps is following this policy wholeheartedly and liberally.

I want to tell you what we are doing about this and about some of these dividends which your Chemical Corps is declaring on your investment in national defense research. Because they point the way to how the peace may eventually be won through science.

First, our work on rinderpest. Early in the war we feared that our enemies might spread rinderpest among our beef and dairy herds. This scourge of cattle, which sometimes takes its toll of people, has never appeared on the American continent. However, it can be spread so easily that saboteurs could have introduced the disease with little difficulty. Do you remember the paper balloons which were blown over to our shores from Japan in 1944 and 1945? We were worried lest these might carry germs to start a plague among our cattle. Many of them dropped in Canada and the United States, and they were carefully examined by Chemical Corps and medical experts.

A joint U. S.-Canadian Commission on rinderpest was formed as one of the first steps in attacking the problem and there was set up on an isolated island on the lower St. Lawrence River a joint laboratory where Canadian, British and American scientists worked together and quickly produced an anti-rinderpest vaccine in quantity. This first vaccine prepared from the tissues of infected animals, an expensive process, was ready to protect our cattle should the disease break out. None of the vaccine had to be used, but the studies at the isolated island resulted in a revolutionary large scale method for producing a new and superior rinderpest vaccine made from propagating the virus in fertile chicken eggs. This new vaccine has already checked one rinderpest outbreak in British West Africa. A million doses of the new vaccine were furnished UNRRA for treating the infected herds of China. The discovery is a benefit to every place on the globe where rinderpest exists or threatens. It will help to relieve starvation in India, China and the Pacific Islands.

Our scientists did important work with the new antibiotics. Important knowledge was gained about treatment of a number of diseases. In December our laboratory announced a method for accurate determination of streptomycin and other antibiotics in the body. Our new method uses only about one-tenth the blood previously required. It is especially useful where only small

(Continued on page 52)

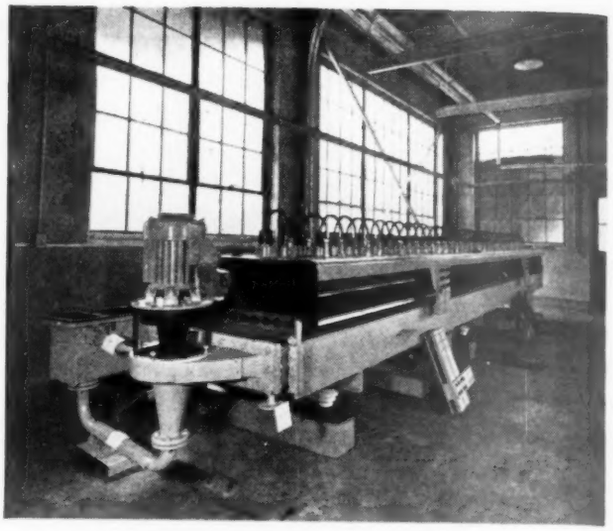
German Chemical Equipment Exhibit

By H. A. KUHN, *Colonel, U.S.A. (Ret.)*

One of the many interesting features of the second annual meeting of the CCA at the Army Chemical Center, May 23-24, was the exhibition of an extensive group of German chemical industrial equipment, assembled with the assistance of the Office of Technical Services, Department of Commerce.

Of major interest to the Chemical Corps and to the alkali-chlorine industry were the two type of mercury chlorine cells. This type of cell produces a high grade 50 percent concentration of caustic soda which can be shipped direct from the cell to the consumer without further processing whereas the cell now installed in the Chemical Corps arsenal plants requires evaporation from 12 percent to a commercial 50 percent concentration. Since in wartime operation practically all the caustic soda is an excess by-product this type cell may offer both a saving in labor and fuel—both scarce, in wartime.

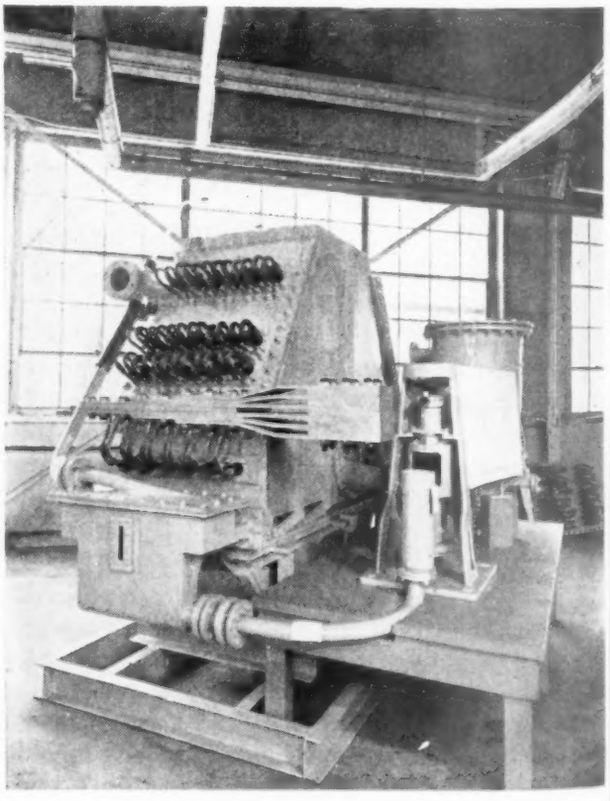
Germany in order to secure a very pure caustic soda for her rayon industry has replaced practically all of her prewar diaphragm cells with the mercury type. Incidentally, Japan did the same thing. Most of the cells were of the horizontal type operating at a much higher amperage than normal in the U. S. In order to secure higher production with a minimum of floor space a vertical type was developed which required about 19 sq. m. of floor space per 1000 kilos as compared with 60 sq. m. for the 7 m. horizontal cell. Both types were exhibited for the first time in the U. S. on May 23.



German 7-meter horizontal chlorine cell

7-meter horizontal mercury chlorine cell evacuated from Hoechst. This cell is complete with mercury pump, steel trough decomposer, anode assembly and graphite grid decomposer blocks. This cell operated at 14,500 amperes. Current density 3400 amps per sq. meter, overall voltage about 5, weight of mercury 725 kilos, output 3.11 lb. chlorine per day per sq. foot of cell area.

Chemical Corps Convention delegates listen to an explanation of how the German horizontal mercury chlorine cell operates.



Drum type vertical mercury cell, the largest of its kind, taken from the Germans.

Vertical Cell

One *drum type vertical mercury cell* evacuated from Ludwigshafen, rated capacity 24,000 amperes. This cell is the latest improved model; 26 of 80 manufactured were actually installed but not operated by September 1944. A single cell of this type was operated experimentally for about a year. This cell was designed for high capacity per sq. foot of floor space. Current density 1720 amperes per sq. meter, voltage 3.75, weight of mercury 1200 kilos, output 700 kilos of chlorine per day at 92 percent current efficiency.

Both of these cells require pure dechlorinated brine and normally produced 50 percent concentrated caustic soda of rayon grade. Both, with special decomposers, can produce 70-72 percent concentrated caustic which can be fed direct to the solid flaking machines without further concentration.

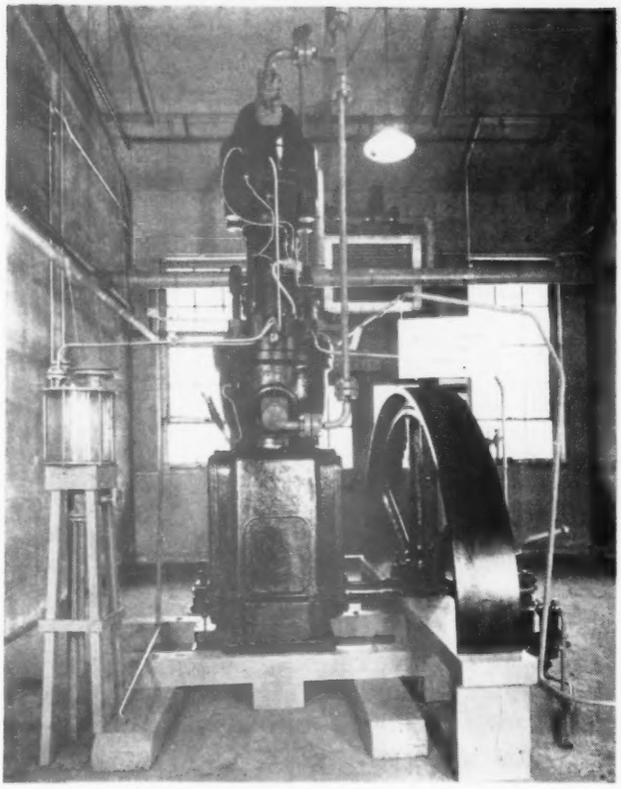
Parallel to the interest in the mercury chlorine cell was the interest in a mechanical transformer developed by Siemans-Schuckert. While the one on exhibition was of 200 ampere capacity, similar ones of 8000 amperes capacity were built for chlorine plant use. This transformer or technically an unformer, produces DC from AC over a wide voltage range with an efficiency of over 98 percent, considerably in excess of an transformer in use in U. S. One of the large size is being built in the U. S. and should be of considerable interest to the entire electro-chemical industry.

A two stage vertical gas compressor evacuated from the Anorgana g.m.b.h., Werke Gendorf to the U. S. for study and test excited attention because of its high pressure capacity. It was designed for operation up to 4000 atm. with nitrogen. When completed it was diverted to compressing ethylene to about 1500 atm. For this purpose it was connected as two single stages in parallel.

Vertical Compressor

The two pistons are driven by a double connecting rod linking the crankshaft with a crosshead between the two pistons. The first stage, bore 28 mm. is below, and the second stage, bore 18 mm. is above. Oil grooves are cut in the pistons and fed with a high pressure oil pump, using glycerine as lubricant. The cylinders are double-walled, shrunk construction. The pistons were lightly chromium plated and polished. The tolerence between the piston and cylinder is less than 0.03 mm.

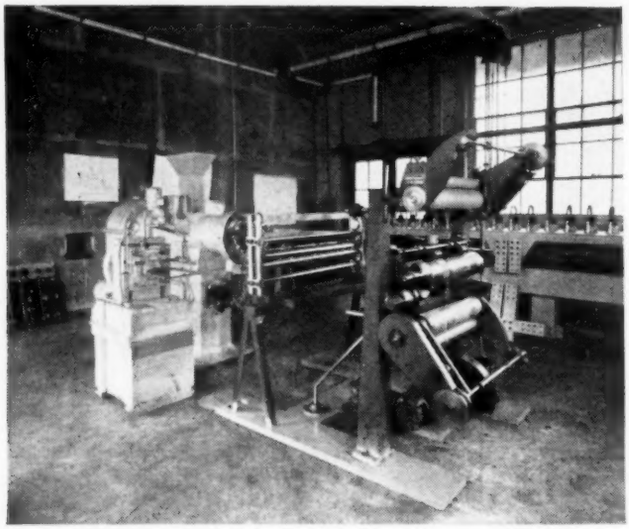
During the war a German concern developed



Two-stage vertical compressor

a novel method of producing an oriented polystyrene film of uniform thickness. This film was used extensively as insulation in high frequency cable and as a substitute for mica in radio condensors. One of the machines assemblies consisting of extruder, spreader, trimmer, takeoff and windup was evacuated to the U. S. and attracted attention of the plastic field.

Some of the boys taking notes on a unique piece of German chemical apparatus during the tour of captured enemy equipment.



Styroflex machine capable of producing oriented polystyrene film of uniform thickness.

Styroflex Machine

Styroflex machine assembly—spreader head removed from extruder—trimmer or slitter, takeoff and upper and lower windup rolls.

This machine extrudes styrene as a tube stretched at controlled temperatures in two directions and slit. The extruded tube is stretched hot in a horizontal plane over a series of small rollers outlining a parabola. This streches laterally at the same time the stock is stretched longitudinally by the takeoff mechanism. Sheet thickness is controlled by the takeoff speed. For further control, two small air jets (2 in. water pressure) played on the cylinder as it emerges slightly hardens the portion in contact with the rollers. Leaving the wide end of the parabola, the tube is slit by fine blades and the two sheets pass to the wind up rolls.

To produce the large number of high pressure vessels, 200-700 atm., required for increased war production with the minimum use of corrosion resistant material the I. G. Farben-industrie developed the wire wound pressure vessel. These proved highly successful, not only allowing the core only to be of corrosion resistant material but produced a much lighter as well as more uniform body than the conventional thick walled vessel. Small vessels were constructed which withstood pressures up to 4000 atm. Several shapes of these wire wrapped vessels were in the exhibit.

A number of pieces of late model German laboratory equipment were displayed. They included a drying oven, a high vacuum oven, an incubator and a furnace. Technical equipment included a new type of hardness tester, a tensiometer and optical pyrometer. The Public Health laboratory which is testing a Zeiss phase control microscope exhibited a series of photomicrographs of living unstained cells showing details not possible with the ordinary high power microscope.

The outstanding feature of the display of the German drugs of interest to U. S. medicine was Periston, the synthetic blood plasma substitute. This compound, polyvinyl pyrrolidone, was used in transfusions, loss of blood due to injuries, etc., in more than 40,000 cases. It is inexpensive, easily stored in any climate and compatible with all blood type. It will be produced in the U. S. in the near future.

Other drugs included several of interest in cancer research—others in the treatment of typhus, of asthma and certain types of dermatitis. An activated carbon impregnated cellulose fiber was stated to be 20 percent more absorbtive than cotton and of particular value in treating certain types of infected wounds. A colloidal silver cellophane bandage, an experimental type of self-sterilizing wound dressing attracted considerable attention. All of the drugs displayed are currently being investigated by U. S. manufacters.

It has been decided to retain most of the equipment at Edgewood where it will be available for further study by interested U. S. concerns.

REPORT OF FINANCE COMMITTEE

The Finance Committee in this past year has had the job of setting up and approving the records and ledgers of the Association in a manner that will insure proper accounting for funds received and disbursed as well as periodic audits of such records. During the year changes in the accounting records were made as it was found that more complete records were needed. Based upon experience and the "Statement of Comments" by William F. Parker & Co., Certified Public Accountants, who audited the Association's books as of 30 April 1947, it is anticipated that continued changes and improvements will be made.

As a step toward controlling costs, it is felt that the Finance Committee should set up budgets for the different operations of the Association. However, this phase of the work has been deferred pending completion of the year's operations so that a firm basis would be available upon which to base such budgets.

R. DONALD ROGERS
Vice President, Chairman
Finance Committee

Edgewood Demonstrates New Progress

JOHN F. CARROLL, *Capt., Cml Res*
Associate Editor

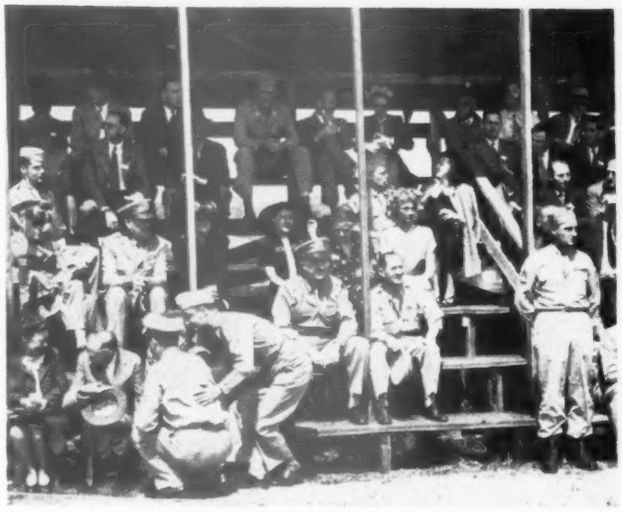
"Old soldiers may never die, but they certainly do improve," was the way one wag characterized the Chemical Corps field demonstration at the annual Edgewood meeting this year.

Unfortunately, only a sprinkling of the "boys," both enlisted men and OCS Kadets, who participated in the "dawn shoots" across the Gunpowder, the Pasig or the rivers of Germany were present. The audience was made up largely of chemical industrialists to whom this demonstration was a revelation. But even those who wore the Crossed Retorts during the war readily admitted that it was one of the best shows they had witnessed.

The morning overcast cleared away in favor of ideal ground observer's weather and practically every seat in the stands was filled with swivel-chair strategists when the ruffles and flourishes of the Edgewood Band announced the arrival of Gen. Alden H. Waitt and his party.

In sharp contrast to the "P. A." system at the riding hall dinner, every word of the demonstrating officers was perfectly audible. Some of the visitors were somewhat disappointed after having seen at their Reserve Components meetings motion pictures of the 4.2 recoilless mortar. However, they were very much impressed by the new long range 4.2 with its swivel-hipped baseplate. Under fear of being excommunicated from future meetings, the writer must pause here and tell you that it is really a hush-hush proposition,

Searing anti-personnel streamers are sprayed over the horizon as a W.P. bomb is detonated during the demonstration.



according to the officer in charge. A policy redolent of topside CWS during the war, "You can't mention this and don't write of that!" Then, after hostilities claim that the reason why the Nazis did not use this was because they knew we had so much of that. Why the Chemical Corps would have 50,000 more boosters if that many of our wartime associates had the opportunity to witness personally what our incendiaries did to the mainland cities of Japland! Instead they read of gigantic B-29 raids but never fully appreciated CW's contribution because they were not told, while the Air Force walked off with the wartime headlines and citations and the peacetime appropriations.

There were the usual portable and tank-borne flame-thrower attacks on fortifications, a mobile rocket-launcher, and the dropping of jellied gasoline belly-tank bombs. However, as we said in the opening paragraph, all of these tactical operations were carried out with the last word in efficiency. All the way from the firing of the colored smoke grenades, 4.2 and rifle flares, right up to the unit assault on a fortified position, the writer did not observe a single "dud" munition or an officer or enlisted man who did not perform his role in a most efficient and intelligent manner. The whole demonstration was a tribute to the personnel of the school personnel under the supervision of Colonel Barker and the Post Commandant, Gen. E. F. Bullene, who, unfortunately, was hospitalized during the convention.

Report of the Research and Development Committee, May, 1947

In absence of Col. Marshall, Vice President in Charge of Research and Development, the report was read by Col. Sutherland.

Research and development are two very frequently used words. Most everyone uses them in nearly every phase of endeavor. These two words are often caressed by radio announcers, used flamboyantly by advertisers, praised by executives, extolled by technical editors in their publications, and used so frequently by reporters for the newspapers that the general public accepts them as magic words. How often have you heard our ranking officers of the Army and Navy use these words? They're used in nearly every speech and on Capitol Hill they have really been extolled in a grand and lavish way. However, last November, "We, the people" elected many new names to represent us. These representatives are now attempting to reduce expenditures to carry out the promises made to their constituents. All of us are demanding an economy in governmental spending. As the appropriations are made from year to year they will probably become smaller, and you will see headlines like these: "Military Leaders Worried by Research Fund Slashes," "Lack of Funds Causes Military Research Program to Lag," and "Taxes and Budget Amenable to Cuts." These headlines are actually now appearing.

During the last depression in the early thirties many industries practically eliminated their research staffs and departments. The development groups were also drastically reduced. Other industries reduced their research and development personnel very carefully and selectively. The dead wood was trimmed out carefully and some of the older members retired. The industries that eliminated their research and development departments or cut them drastically have suffered severely during the past few years, whereas the companies that carefully and selectively maintained their research and development group have been rewarded many fold. Carefully pruning a fruit-bearing tree increases its quality and yield-bearing ability. Likewise the careful pruning of research organizations will improve their productivity. A great deal can be done with carefully spent appropriations. However, you cannot take months and months to make up your minds. If this is done, and it has been, all concerned lose interest. After the appropriation is granted to a Service, how much is earmarked for research and development or do these activities come last? The complaint is raised that industry is not interested in performing contractual research for the Army. Industry is busy with its own problems, but I do not know a single industry that will not assist the Army in its research and development problems if the problem were presented properly to the right people. Industry and many of the universities have the facilities and personnel to really assist and

(Continued on following page)

NEW RESEARCH AND DEVELOPMENT HEAD FOR 1947-1948

DR. RAYMOND KIRNER

Elected Sixth Vice-President, Chairman of Research and Development at the Second Annual Meeting, Edgewood Arsenal, Dr. Raymond Kirner brings to the Chemical Corps Association a background of education, experience and genuine interest in chemical problems. Born at Chicago, Ill., he attended University of Illinois, receiving the B.S. degree in 1918 and in 1924 was accorded Ph.D. from Harvard University. Further graduate study was taken at University of Munich, University of Graz, and at the University College, London.

Dr. Kirner was Organic Chemist, Coal Research Laboratory, Carnegie Institute of Technology, from 1931-46 Technical Aide, Division B, National Defense Research Committee, 1940-43; Chief, Division 9, NDRC 1943-46; Director, National Research Council of Chemical-Biological Co-ordination Center. He received the Medal for Merit from General Waitt in October 1946.

prosecute the problems now confronting the several services of the Army.

Scientists and engineers, some in uniform and others in civilian clothes, really started to serve the Chemical Warfare Service very shortly after its inception during World War I. If you are interested, take time to read the Research and Development Reports prepared during World War I and shortly thereafter. These reports are on file in the Technical Division Library, Edgewood Arsenal, Maryland. Note the names of the authors of these reports and you will find them to be the famous scientists and engineers of today's world. You will also find many of the things we did during World War II were but further developments of research and engineering achievements that were started during World War I. The older members of this Association can recall the birth of Edgewood Arsenal, its growth during World War I (and let's get down to facts) its deterioration when appropriations were reduced during the years following. Early in 1941, with the help of old blood, new blood and appropriations, Edgewood Arsenal grew, flourished and became the mother arsenal of Huntsville Arsenal, Pine Bluff Arsenal, Rocky Mountain Arsenal, Dugway Proving Grounds, Camp Detrick and many other installations and facilities.

The impetus of World War II made the Research and Development Departments of the Chemical Warfare Service and all other Army and Navy Services grow by leaps and bounds, but remember that our great Allies held the lines during both World War I and World War II while we got going. The Chemical Warfare Service was expanded and added many new weapons to assist in the winning of World War II. The duration of the war was also longer and every service added many new weapons. It is reported that Hitler once said this last war was being fought to determine whether Berlin or Washington was to become the capital of the world. I doubt if any of us know this to be a factual statement, but we do know that Berlin fell better than two years ago. We know that Washington is a very important capital city. We also know that we had time, or at least some time, to get ready for World War I and World War II. *Will we have time to get ready for World War III* before we enter the shooting part? History will give us the answer but can we afford to wait that long? All of us as individuals believe in life insurance, fire insurance, health insurance, accident insurance and personal liability insurance. Research and development is the life blood of our national insurance. The Armed Services of the United States must be afforded the necessary insurance needed to insure an adequate and vigorous research and development program. In turn, the Services must use the facilities available to them to include industrial and university laboratories.

Our forefathers made this Nation what it is today. They did this by working long hours and putting politics aside after elections. They didn't accomplish these things by working only eight hours per day with time out for lunch. Other people in other countries are working far more than eight hours per day five days per week, and their destiny comes first, not second.

Research and development in any form costs money. Spending large sums of money does not always attain results. This type of work is the greatest modern gamble known. A great deal of faith and confidence must be placed in the individuals directing research and development. This in turn means that the directors must be carefully selected. The directors of research must also be carefully controlled by individuals capable of judging the value of the work performed. Decisions must be carefully made to determine what projects should be prosecuted vigorously, and to weed out worthless projects that have become pet hobbies of certain individuals. Further, after something has been developed don't forget that the day may come again when shortages exist, therefore several known substitute materials must also be developed that are readily available. During World War II a good bit of our time was spent in seeking adequate substitutes. These substitutes should have been known, but they weren't.

A short time ago I directed a letter to the several members of the Chemical Warfare Association's Research and Development Committee asking them for their specific recommendations so that their ideas and thoughts could be incorporated into this report. Please allow me to quote direct from these letters. "As you know, I am a member of the Research Council appointed by General Waitt to advise him, and this council is actively at work on major problems of research and development. There is, in addition, a Liaison Committee appointed by the American Chemical Society with which I believe you are associated. Colonel ——— and I are agreed that the Committee of the Chemical Warfare Association can hardly do more than act in a standby capacity until or unless some definite functions and responsibilities that are assigned to it by the Chief, Chemical Corps."

Another letter brings out a similar thought—

REPORT ON RESEARCH AND DEVELOPMENT

"At a recent meeting here when General Waitt was out I had a chance to chat with Colonel ——— for a few minutes and he raised the point that there was possibly a duplication of our efforts with the Technical Advisory Committee. In this I am in agreement and it seems to me that the main function of the Technical Committee of the Chemical Warfare Association should be that of a liaison agency to filter into the Chemical Corps any development in industry of potential interest to the Chemical Corps. One of the enunciated duties of the Chief's Technical Advisory Committee is to serve this function, but a cursory examination of the members of that committee raised the question as to whether they are in a position to best serve as liaison with industry since most of them are purely academic men. It seems to me that if your report at the annual convention raised no more than this question and had it settled, definite progress will be made."

Your Research and Development Committee members for this past year were selected from the civilian and officer rolls of the Medical Research Division and the Technical Division of the Chemical Warfare Service. It is interesting to note that their thoughts are quite similar. . A third member of the committee has reported as follows:

"As you know, there are several activities under way on the part of the Chemical Corps, i.e., research contracts, a series of advisory committees and special groups such as the ACS Advisory Committee, the Research Council, special groups for Detrick, etc. Some of these have barely started doing anything and others are in full operation, but most of them have fairly specific functions as regards research and (to some extent) development. None of these groups make satisfactory use of reserve officers and officers on inactive status. Something ought to be done about this situation, but in some ways General Waitt's hands are tied. He does not have any control over such officers and no funds are available for training.

"Nevertheless there should be something which can be done for those former officers who are primarily connected with research and development as distinguished from troop and other officers. The chief difficulties in the way are (1) lack of money to pay travel and stipends; (2) difficulties with clearance since every one must be cleared again no matter what his status may have been during the war.

"The crying need today is to avoid following the beaten path too much. If a war comes within a year many of the items under development at the close of the last war would be used. If war is deferred even five years most such items would be out of date and the Army will be fighting a war along entirely new lines.

"I would suggest that a series of committees be formed just for the purpose of getting new ideas which might be of military value. Each committee could cover some broad field and then there should be a super committee with military advisers which would screen the ideas and carry through to see that they are acted on.

"In order for such committees to be effective they will need some guidance in the form of the broad outlines of military policy.

"A few of the fields in which such committees might be formed would be the following:

1. Screening smokes. The whole use of screening smokes will have to change. If possible they should be opaque to radar, realizing that this is a tough nut to crack. The screens may have to be established in matters of seconds at so many possible points that the entire method of generation used in the last war may prove useless.

2. Dissemination of solid materials. This is an old problem, but there are so many highly toxic materials which are thermo-labile and yet extremely toxic that any new ideas on this subject could be of immense value.

3. Flame warfare will undoubtedly be used in an entirely different way probably with long range projectiles. New ideas here are essential.

4. Decontamination methods will have to be changed if one takes account of biologicals and radioactive materials; that is a particularly hard nut to crack but evidently a brand new approach is essential.

5. Protection must take account of many new factors.

6. Detection must now cover such a range of materials that kits developed during the war must be considered obsolete at the present time; this is one of the toughest jobs of all.

"Anyway, the officers could be made to think about these matters and I am sure they would be glad to do so if they were convinced that their ideas would be given careful consideration. Not one idea in a hundred would be worth pursuing but that one would make the scheme worthwhile."

Another member of your committee has reported as follows:

"Can't something be done to strengthen and better organize the Research, Development and

(Continued on page 63)

Operation Lease

By Lt. Col. Frank Chrencik

When the requirements for certain toxic agents were satisfied in 1945, plants producing these agents were closed down. This situation, however, did not result in the shutdown of the Chemical Corps chlorine-caustic plants whose products were being used as intermediates for toxic gas manufacture. To the contrary, chlorine and caustic production continued at even a higher rate in order to alleviate one of the W.P.B.'s most serious problems in heavy chemical supply and distribution. The exigencies of a war dictated that no delay be experienced in the transfer of this rather unexpected source of chlorine and caustic production to other purposes in critical need.

After the sudden end of the War, the need for chlorine and caustic continued to be critical without any expectancy of relief. Under this situation shutdown of Chemical Corps chlorine-caustic plants for approximately 18 months was necessary before the desirable precedent of leasing government facilities to private industry and resumption of operations could be accomplished. The whys and wherefores of such a costly delay to our national economy is a good topic for any soldier, politician or industrialist, but it all boils down to a fine job of winning the war without sufficient attention to cleaning up the mess that must be expected after any job of sizeable undertaking.

Without immediate plans, it was necessary to place such useful plants in standby. War Department directives for placing plants in standby met with as many interpretations as there were people directing the standby work. Standby directives define a standby plant as one being capable of resuming production within 120 days.

A Group of Delegates are conducted of a Tour through the Cell Battery of the Diamond Alkali Plant at Edgewood.

Inspecting one section of the Diamond Alkali Chlorine Plant at Edgewood

All of the Chemical Corps chlorine-caustic plants are now leased to various concerns as follows:

	Capacity in Tons Chlorine
Edgewood Arsenal—Diamond Alkali Co.	50
Huntsville Arsenal—Selway Process Co.	100 (2-50 Ton Plants)
Pine Bluff Arsenal—Diamond Alkali Co.	50
Rocky Mountain Arsenal—Colorado Fuel & Iron Corp.	100

The restarting of these plants under pressure to relieve a critical shortage of chlorine and caustic presented a good demonstration of what would have been experienced in the event of a national emergency. In spite of standby directives and the work performed in compliance therewith, only two of the five Chemical Corps chlorine-caustic plants leased to private industry were capable of resuming operations in less than 120 days.

In the particular case of the Edgewood Arsenal chlorine plant, the work of placing the plant into operation was begun on October 14, 1946, and it was not until April 14, 1947, that the plant could resume production. Although but few of the former operating personnel were available, an organization was assembled within a few weeks. Most of the startup period was consumed in rehabilitation of the plant to insure a reasonable continuity of operation after starting. Even though nearly all equipment was in operation or operable when the plant closed down, deteriora-

(Continued on page 44)

Future Chemical Warfare Possibilities

By COL. M. E. BARKER

Chemical Corps Commandant, Chemical Corps School

Introduction

The members of the Chemical Warfare Association are much interested in the future weapons which the Chemical Corps will manufacture and either issue to its own troops for use, or supply to the Ground Forces and the Air Forces for combat purposes. In order that these weapons may be understood it seems appropriate that a general study of their past performance should be made and a general statement made as to the possibilities and probabilities concerning future developments. Wherever individuals of the Association have specific ideas which they believe will expedite development of any of the materials described in this article, they are urged to set down their suggestions in the greatest possible detail and submit these suggestions to the Chief, Chemical Corps, marked for the attention of the Chief, Research and Engineering Division.

We will proceed now to discuss some of the major weapons concerning their past development and present status and use during past wars and the probable trend which their future development will take.

Mortars

Since mortars are the mankillers of modern battlefields, and heavy mortars are the most effective for this work, we will start with the 4.2-inch chemical mortar. At the end of World War I this smooth bore weapon could fire twenty big shells per minute to a distance of eleven hundred yards. It was the best heavy mortar in the world, in spite of the tumbling shell, inaccuracy and the short range. By 1930 the barrel of this mortar had been rifled and the base of the shell provided with an expanding disc so that the shell was given true flght, while the muzzle loading rapid fire features were retained. This improvement increased the range to twenty-four hundred yards and improved the accuracy without changing the weight of the shell, the filling, the mortar itself, or the propelling charge. That was a real advance, because the mortar could still be fired twenty times per minute for two or three minute bursts.

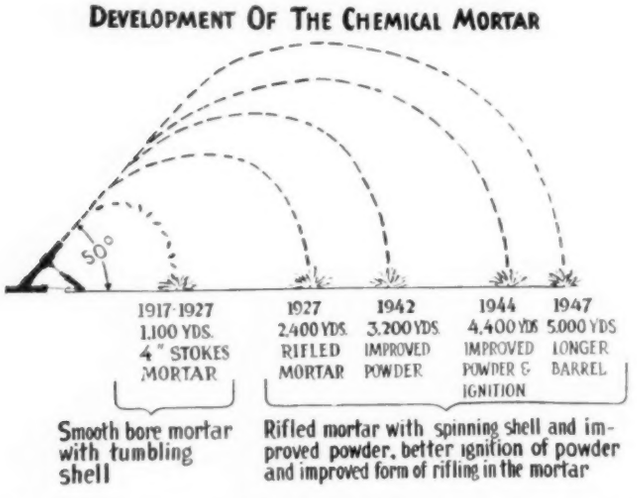


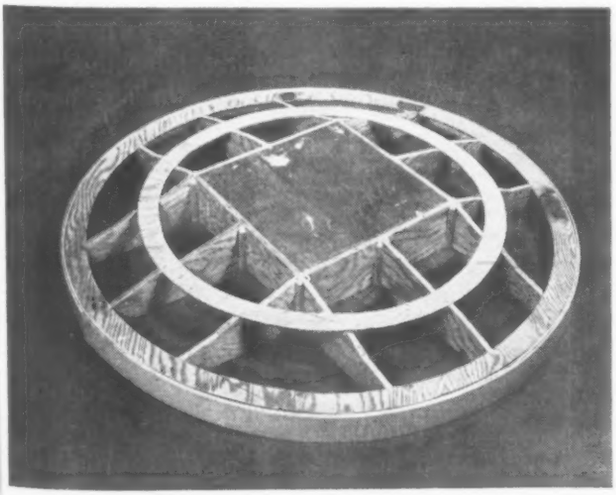
Diagram showing progressive increase in range of the 4.2" chemical mortar during the past thirty years.

Design of a 5.5" Super Chemical Mortar proposed by the author

Improvements in propellants and methods of ignition during 1940-41 stepped up the range first to thirty-two hundred yards, then to an official maximum range of forty-four hundred yards, though the weapon was fired many times at ranges exceeding five thousand yards in battle. An increase in the length of the barrel and a change in the manner of starting the rifling in the barrel, and a few other small improvements added another thousand yards to the range on the proving ground; but this development did not get into production. The factories were too busy turning out millions of shells, thousands of standard mortars, and quantities of spare parts to feed the hungry appetites of twenty-four mortar battalions firing all the way from Italy to Burma. Now that we have had time to put together some of the tricks learned by the Germans, the Japs, the Russians, and our own researchers, we find that we can build a mortar that will give extreme accuracy at five thousand yards range and good area accuracy at seven thousand yards

or more. That is enough. Artillery and long-range rockets can handle the battlefield from there backward more effectively than can mortars. We must learn where each weapon can do its most effective work and keep it on that job. A six-fold increase in range in a few short years is no mean accomplishment for any weapon.

While the 4.2 mortar is unquestionably the best heavy weapon of its type in the world both as regards accuracy and filling efficiency of the shell, yet this weapon leaves much to be desired as the ideal weapon for chemical troops. It has now been decided that each infantry regiment will have one full company of infantry troops armed with the 4.2 chemical mortar. For the time being chemical mortar battalions will be assigned to field armies and will be available to supply masses of fire wherever such massed fire is necessary and desirable from a tactical standpoint. The infantry units will therefore supply most of the close-in scattered precise fire support. In order that the massed fire may be most effective, especially with gas or chemical filling, it is essential that every shell carry the maximum possible amount and that the range of the weapon should be sufficient so that two or three battalions at least could be so emplaced as to bring their fire to bear on any particular target within a corps or division zone of action. To do this it is believed that a mortar similar in principle to the 4.2 should be developed using some radical elements of design which would enable a 5.5-inch mortar firing a 35-pound shell carrying 15 pounds of filling to be developed which would have an effective range of at least 6,500 yards with a high degree of accuracy in range up to 5,000 yards. By increasing the personnel presently authorized for the chemical mortar battalion organized under T/O & E 3-25, and by providing heavier transportation for the mortar squad, it should be possible to man 36 of these new heavy mortars with a total of approximately 800 men per battalion, and such a battalion would have a fire power of approximately twice that of the chemical mortar battalion as it existed in World War II. A wooden mock-up model of a proposed design of the new mortar has been prepared. This new model will use a "snow-shoe" principle for the baseplate in order to get maximum stability on relatively soft ground; the barrel will be considerably longer than the present 4.2; and additional facility will be provided in the elevating mechanism to provide for greater traverse once the mortar has been set up in a general direction. In addition, the design of the two-piece baseplate is such as to enable the mortar to be switched in any direction with relative ease without changing the position of the baseplate. However, as in any development starting from scratch there will undoubtedly be many problems encountered before this new mortar is ready for service in the field.



Bottom of proposed "Snowshoe" type baseplate, a radical new design proposed by the author to get increased stability of firing plate form while keeping the weight at a reasonable figure.

Incendiary Weapons

During World War II man's oldest weapon—fire—was harnessed anew as his most effective weapon. Even the atomic bomb did not equal the destructiveness of a single massed incendiary air attack in either the number of persons killed or the amount of enemy property destroyed. One atomic bomb was far more expensive than the whole lot of incendiaries.

Incendiary air bombs of two main varieties (and in size from two pounds to 500 pounds) were perfected and a quarter of a billion of them made during World War II by the Chemical Corps.

First, there was the German electron type bomb, of small size in which a tube of magnesium metal was filled with thermit mixture which, upon being ignited, first melted the magnesium, then set it on fire so that the entire bomb burned. This was an intensive type incendiary that reached a high state of development, but in the future we may expect certain metals to be added to the magnesium which will make a hotter fire and will produce an extremely nauseating smoke from the burning metal. Then, too, there are many mechanical and chemical improvements already known which, taken together, will double the effectiveness of this type of bomb.

The second, or scatter type of incendiary bomb, is the American tin can filled with jelled gasoline. This mixture was ignited in various ways which can be improved. The burning chunks of sticky gasoline were thrown around to considerable distances upon impact or delayed functioning. There were two varieties of these bombs—one which ex-

M47A2 100-lb. jellied oil-filled incendiaries fell on Japan from the 20th Air Force B-29s.

ploded and threw out many chunks of blazing gasoline in all directions, while the other shot all of its charge out of the bomb in one chunk just as if the bomb were a mortar. Now gasoline has a very high BTU, or heating value per unit of weight, but its density is only about three-fourths that of water. What we need, and will get, is a filling at least twice as dense and more sticky than gasoline which will burn more fiercely and will have a higher heat content per unit of volume than does gasoline. We will get it if we have to jell mustard gas and use this as an incendiary filling. That is easy to do, and mustard gas burns with a blue, hot flame. However, there are better incendiary fillings to be had than mustard gas, so we may expect future incendiary bombs to be at least three times as effective as those used in World War II.

The fire raids on Japan were an extremely important factor in destruction of the Japanese war potential. In order that the exact nature and extent of this destruction can be appreciated, it is necessary and desirable to review this operation.

On 9 March 1945 the 20th Air Force launched an entirely new type of air attack on Japan from Guam and Saipan. Three hundred and thirty-four unarmed, and lightly manned, B-29s, delivered 1,665 tons of M47A2s and M69s against Tokyo from an average altitude of 7,000 feet in a surprise night attack. The target was the most inflammable section of Tokyo and a huge fire was started that burned out over 15 square miles of area and shot flames into the sky so high that they could be seen 200 miles away. The results were so astounding that all the incendiary bombs available were dropped in the week and it was a month before the supply could be replenished and incendiary bombing resumed. In all, 12,146 tons of incendiary bombs were dropped on Tokyo which burned out 56 square miles of area. Four other major cities were incendiary bombed and 52 secondary cities were destroyed. In all, 95,776 tons of incendiary bombs were dropped on Japan, burning out 170 square miles of the most important urban area in the empire. In connection with this bombing some average figures are impressive. In Tokyo, it took 215 tons of incendiaries to burn a square mile of area; in all major urban centers it took 403 tons per square mile; in minor cities for relatively small and well defined targets it took 710 tons; while for all targets it took an average of 563 tons of incendiaries to burn one square mile of Japanese urban area.

This complete destruction of such a large part of Japanese industry, coupled with her decisive defeat in the Philippines; her annihilation on Okinawa; and the destructon of her navy and air force as effective fighting units made further resistance on her part futile. The doom of the Japanese Empire was sealed before the atomic bombs were dropped, but this weapon served to dramatize her situation and was a perfect "Face-Saver," so important in oriental politics.

Whether the cave is the ultimate defensive answer or not is open to question, at least on the tactical battleground. Men in dugouts are ideal

(Continued on page 46)

The M2-2 portable flame thrower being used in the wall city during the battle for Manila in 1945. Really improved models are needed.

ARGENTUM VIVUM, Age 3500

There is evidence to indicate that the metal Mercury was known as early as 1600 B.C. Anthropologists have discovered amulets, containing what appeared to be Mercury, entombed with Egyptian mummies. During the Roman era, the fluid metal was called *argentum vivum*, or living silver. Since the time of the ancients, mercury salts have achieved an ever-increasing importance. Metallurgy, chemistry, medicine, temperature recording, and electrical conversion are a few of the categories in which Mercury plays an important rôle today.

The wide variety of analytical and industrial uses of mercury compounds demands chemicals of maximum purity and dependability. Merck & Co., Inc., for almost four generations, has set the pace in production of fine laboratory chemicals. The Merck label, which conforms to A.C.S. methods of stating maximum impurities, always has been the chemist's assurance of uniformly high quality.

Among Important Merck Reagent Mercury Compounds:

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The Mail Bag

WAR DEPARTMENT
THE CHIEF OF STAFF
WASHINGTON

20 May 1947

Col. Ludlow King, President
Chemical Warfare Association
2153 Florida Ave. N.W.
Washington, D. C.
Dear Colonel King:

It is a pleasure to greet the members of the Chemical Warfare Association on the occasion of their second national meeting.

Although relatively young, your organization has enrolled a large membership of Chemical Corps veterans and industrial leaders who have a continuing patriotic interest in our national defense. It is materially assisting the Army in the encouragement of scientific research and development.

I extend to the Chemical Warfare Association my warm regard and best wishes for the future.

Sincerely,

DWIGHT D. EISENHOWER.

WAR DEPARTMENT
OFFICE OF THE CHIEF OF STAFF
WASHINGTON D. C.

20 May 1947

Col. Ludlow King, President
Chemical Warfare Association
2153 Florida Ave. N.W.
Washington, D. C.
Dear Colonel King:

On the occasion of the second national meeting of the Chemical Warfare Association, I am happy to greet you and to extend my thanks for your fine program of co-operation with the armed forces during the past year.

It is difficult to realize that the Chemical Warfare Association is indeed little more than a year old, so active and effective has it been in assisting our national defense activities.

I am particularly grateful to the Association for its excellent work in helping to organize the Industry-Army Day program in Chicago. Letters from many of the 1,500 guests at this meeting attested to its success and the importance of the discussions which were held there.

Please accept my best wishes for the future of your organization.

Sincerely yours,

J. LAWTON COLLINS
Lieutenant General, G.S.C.
Chief of Information.

WAR DEPARTMENT
WASHINGTON, D. C.

16 May 1947

Col. Ludlow King, President
Chemical Warfare Association
2153 Florida Ave. N.W.
Washington, D. C.
Dear Col. King:

I wish to take this opportunity to extend my congratulations and best wishes to the members of the Chemical Warfare Association.

Since organization of the Association on February 6, 1946, your membership has demonstrated its value to the War Department and to national defense in many ways. Perhaps one of the most important of these is in furnishing an organized, patriotic group of experts in the chemical field to whom the military can turn for consultation on its problems. This cooperation between expert civilian groups and the uniformed services is invaluable to the development of a well balanced national defense program.

I am sure that in the future the Chemical Warfare Association will continue to be of vital assistance to the War Department and to the country.

Sincerely yours,

F. L. PARKS
Major General, G.S.C.
Chief, Public Information Division

WAR DEPARTMENT
WAR DEPARTMENT GENERAL STAFF
RESEARCH AND DEVELOPMENT DIVISION
WASHINGTON, D. C.

21 May 1947

Col. Ludlow King, President
Chemical Warfare Association
2153 Florida Ave. N.W.
Washington, D. C.
Dear Col. King:

I am happy to extend my felicitations to the members of the Chemical Warfare Association on the occasion of their second annual meeting.

In the task of maintaining our nation's leadership in the field of military research and development, the assistance of expert groups such as the Chemical Warfare Association is invaluable. It is only through the continued cooperation of industry, science and the armed forces that our goal of a strong and modern defense machine can be fully achieved.

It is a source of great satisfaction to me, as well as to the other officers of our Army, that your organization has displayed such excellent leadership in achieving a patriotic unity of effort for our country's security.

Sincerely yours,

H. S. AURAND
Major General, G.S.C.
Director of Research and Development

WAR DEPARTMENT
CHEMICAL CORPS
CHICAGO CHEMICAL PROCUREMENT DISTRICT
CHICAGO, ILL.

28 May 1947

Mr. Joseph Schwimer
Chemical Warfare Association
2153 Florida Ave. N.W.
Washington 8, D. C.

Dear Joe:

Upon my return to Chicago from the convention at Edgewood last week, I felt more than ever that all of us should get behind the Association and do whatever possible to improve its position. Personally, the meeting was one of the best of its sort that I have ever attended and I enjoyed every minute of it. I suspect that you are probably receiving any number of letters from those who attended the convention, all of which will express their appreciation and pledge their support. I know of no one that I talked to that did not enjoy it thoroughly and I am sure that they came away with the same feeling of confidence in the Association's future that I did. I enjoyed particularly the Saturday morning open meeting when some of the boys let down their hair and proceeded to tell off the big boys in the Chemical Corps. It was all good criticism and I am sure the Chemical Corps people involved will accept it as such. I sincerely hope that the conference Les Sutherland and Pete King said they were to have with General Waitt accomplishes the results you and Pete hoped that it will.

Enclosed herewith is a brief notice which I thought you might like to have on our last meeting of the Chicago Chapter on April 3, at which General Waitt was our principal speaker and it is hoped by all of us here that Rodier can see fit to give our chapter some publicity in the next issue of the Journal.

You will recall that I mentioned to you that General Montgomery was speaking to us here on 11 June and we would like very much to have you and Pete King, if possible, both come out and spend the evening with us for I am sure that General Montgomery will be a most effective speaker. In the event you can make it, we would appreciate it very much if you would let us know a few days in advance.

Again let me express my congratulations to you and all those who helped plan the convention, and looking forward to bigger and better things for the Association during the coming year, I remain,

Sincerely,

CARL S. CASTO
Lt. Colonel, CmlC.

JOHN TWEEDDALE
5201 Torrance Blvd.
Torrance, Calif.

May 17, 1947

Captain Joseph Schwimer
Chemical Warfare Association
Washington, D. C.

Dear Captain Schwimer:

I find the Chemical Corps Journal to be the best among all the publications I receive. In fact it is the only magazine I have time to read, to treat myself to that recreation whenever the Chemical Corps Journal arrives. I have only one fault to find with it. It doesn't come often enough.

With best wishes and regards, I remain,

Sincerely yours,

JOHN TWEEDDALE.

Leghorn, Italy
29 May 1947

Dear Tony:

Long time no see but certainly glad to hear from you and that you are still very much among the living and still as active as ever in Chemical Corps activities.

I'm theater chemical officer here. The only Chemical Corps Officer in the theater assigned to chemical duties, which consist mainly of getting the remaining supplies out of MTOUSA and either to Germany or the States.

To my knowledge there are only two other Chemical Corps Officers in the theater: Lt. Col. Tyson, formerly with the 88th Division is now Theater Special Services Officer, and Lt. Col. Cheddick, who sits as a permanent member of a General Courts-Martial.

John Palmer, whom you may recall as a Technical Sergeant with the First Division, at Fort Hamilton, is a Lieutenant Colonel and one of the so-o-o-o many assistant G-4s at headquarters, EUCOM, formerly USFET, Frankfurt, Germany.

Beat your letter as to membership. Secured an application form from the April issue of the Chemical Corps Journal and submitted same, so will be looking for my name in the July issue.

Was interesting to run down the list of members and to find so many that I knew. Names of some that through time sort of escape your memory. Many that I know do not appear on the April list, but I'll be searching for those in subsequent issues.

Hope your annual get-together at Edgewood Arsenal was a huge success.

Remember me to any of the boys of our mutual acquaintance.

As ever,

J. WATSON.

James Watson
Maj., CmlC., 0482200
85th Ord. Base Depot
APO 782, P/m, New York, N. Y.

12 May 1947

Honorable Robert A. Taft
U. S. Senate
Washington, D. C.

Dear Senator:

I am writing you to enter a strong protest concerning the proposed plan of the War Department to cut the numbers and reduce the salaries of technical personnel engaged in research and development for the Army. This step was reported in the April 28 issue of *Chemical and Engineering News*, official organ of the American Chemical Society, and it has been confirmed by private communications.

I was fortunate to have served as a Colonel in the Chemical Warfare Service during the last year, being assigned as Assistant Chief, Technical Division, in charge of research and development for that service during a four and one-half year period. In that post it was all too evident to me that the policy of niggardly appropriations established in prewar times had left us far behind our enemies technologically speaking. It was only by the expenditure of vast sums of money by the Armed Services and by the Office of Scientific Research and Development, together with immense efforts by our assembled scientists both in and out of uniform that we were able first to equal and then to surpass the achievements of Japan, and particularly of Germany.

My final six months of active duty, during the last half of 1945, were spent in an effort to help set up peacetime programs and a peacetime organization while the enormour wartime one was being decimated by the demobilization of the Army. We were able to convince many capable officers and civilians that the Army's program was not only worth while but truly essential. And a well-rounded organization has indeed been created in the various Technical Services of the Army. However, in nearly every case one of the chief fears of the scientist being recruited was that an economy wave would hit him when interest in the Army died down, and thus that his security in the job would be lacking. No technical man can do his best while personal worries beset him. We who were doing the recruiting assured the doubter time and again that his fears were groundless. Congress never would permit research in the Armed Forces to lag. The lesson had been learned once and for all and we honestly and sincerely felt that was the case.

The recent reports of a general reduction in salary grades for all technical personnel, and of a reduction in strength, came as a terrible blow, in my opinion, at a time when such can least be afforded. The damage to the morale of the organization by the threat alone is already widespread. If indeed the reports are correct, it will take a great and noble feeling of patriotic duty on the part of many of the Army's scientists to keep them in Civil Service. This is particularly true now when industry is clamoring for men and paying truly fantastic salaries even to the veriest tyro. Since technical men are at such a premium at the present time, and will continue so to be for several years, any reduction in staff will work serious permanent damage to the program.

I cannot tell from what I read and hear whether this reported move is due solely to the pressure for budget reductions caused by a laudable though dangerous "economy wave." I am struggling along with many others under what seems a heavy tax burden, but I would far rather so struggle than feel that my security was being weakened in order to save me a few dollars.

May I urge, Mr. Senator, that you use your powerful influence to insure sane consideration of the appropriations for the Armed Forces, and for the Atomic Commission. Sufficient funds must be provided to keep the organizations which have been built up over the past two years with such difficulty intact for their work of keeping us abreast and even ahead of any potential enemy, technologically. I can think of nothing more vital to the security of our nation at the present time. We will have no time to "catch up" in another war. Can we afford the luxury of economy under the circumstances?

Sincerely,

EDWIN R. BAKER.

3607 Zumstein Ave.
Cincinnati, Ohio

FERRO ENAMEL CORPORATION
CLEVELAND, OHIO

June 9, 1947

Mr. Joseph Schwimer
Chemical Corps Association
928 Fifth St. N.W.
Washington 1, D. C.

Dear Joe:

I have been out of town since attending the get-together at Edgewood Arsenal on May 23 and 24 and would like to say here what a grand party and show you and the committee put on. There certainly is a lot of work and effort tied up in one of these affairs and I don't see how you can improve on the quality and the handling of such a large crowd.

We are behind this 100%, and if there is anything that we can do, please feel free to call upon us.

Best regards.

Sincerely yours,

GLENN A. HUTT
General Sales Manager

Back Stage With Reppe

By DR. M. H. BIGELOW

Recently I had the pleasure of delivering to the Reinhold Publishing Company a sizeable manuscript covering as much of the field of acetylene chemistry that I could find in Germany. Actually it is an abstract of some 28 tons of documents pertaining to Reppe chemistry. For this article I thought I would go back stage and give a preview of some of the material that is being covered in this book.

I am ashamed to admit that until I met Reppe in Germany I had not known of the man or his accomplishments. When I returned to the United States I located a copy of the American Chemical Society Monograph No. 99 entitled "The Chemistry of Acetylene" written by Vogt and the late Father Nieuwland.

Although published in 1945, Reppe was mentioned only four times and then as the author of patents. The obvious conclusion is that information of Reppe's advanced work was unobtainable due to the hostilities encountered in World War II. In investigating the I. G. files it was found that most of the important work was covered by unpublished patents which also accounts for our not knowing about it.

The amount of current interest in Reppe's work as evidenced by not only our American scientists but the British and Russian as well is almost phenomenal. Just why does this interest exist and why have we Americans failed to keep abreast with the German development?

The failure to use acetylene as a base material for organic synthesis has probably stemmed from three reasons. First, the unfavorable cost of acetylene when made by the carbide process; secondly, an unwillingness to utilize a chemical which is so hazardous when used under pressure; and thirdly, failure to find the appropriate catalysts. Some of the chemicals derived from acetylene by the Reppe process are made in this country from our large reserves of oil and natural gas. In Germany these natural products were at a premium and the Germans were forced to use materials at hand, which were coal and limestone. Reppe was well aware of the cost of his processes and in a lecture presented three years ago he discussed the question at large and justified his work as follows, and I quote:

"Permit me to touch the subject of the use of acetylene in large technical scale. Some people are of the opinion that acetylene as a starting material is by far too expensive due to high production costs, and others believe that research in the acetylene field should better be stopped and the efforts should be more concentrated upon natural products. There are also people who believe that aliphatic chemistry in Germany should be carried out in the American way based upon mineral oil and natural gas. Synthesis should also be based more upon the use of spirit.

"To these questions my personal ideas are as follows:

"There is no doubt that acetylene production requires considerable amounts of energy for the carbide process. There is a disadvantage that carbide manufacturing must be done at comparatively high temperature (2500° C.). It is to be considered however that acetylene is extraordinarily rich in energy content and extremely reactive. It is capable of undergoing numerous reactions which run easily and smoothly with quantitative yields and considerable release of heat of reaction. The energy which is needed for acetylene production pays well in the course of the following processes. Let us take the production of butadiene from acetylene as an example. High energy is required only once, that is for the production of acetylene, but all the following stages release considerable heat. If butadiene is to be made from mineral oil, however, there will be a constant consumption of energy during the whole process, namely for the fractionation or cracking of the oils to obtain pure butane, cracking of the butane to give butylene, and dehydration of the butylene to butadiene.

"In this case the butadiene is obtained with far less purity than with the acetylene process. The total energy consumption by the mineral oil process cannot be less than that required by the acetylene process. For other products which are made in America on the basis of natural oils the same facts hold true and the carbide process has an established future in Germany. Mineral oils as a starting material have no substantial advantages. This question need not be discussed in Germany anyway because we have no large amounts of mineral oil or natural gas, whereas limestone and carbon is abundant.

"American methods can be copied in Germany, indeed, but by no means is it possible to transfer the American situation regarding raw materials to Germany. There is also to be considered that natural mineral oil sources will be exhausted in a few decades and carbide is the only safe funda-

mental process in the long run. Carbide production in Germany is still in its childhood and new carbide processes will certainly be discovered which do not require expensive electrical energy but permit the production from lime and carbon in a thermic way."

Ever conscious of high efficiency and low costs, Reppe was quick to adopt methods of making acetylene by other processes than the carbide one. He favored modification of the process for making "synthesis gas." In this process olefins such as methane and ethane were burned under special conditions so that a high percentage of acetylene was formed in the process. To accomplish this the hydrocarbon gas is burned in special burners and the flame is continuously quenched with water. The burning cycle of the gas is regulated so that at no time is the gas being burned for more than 1/100th of a second. Elaborate infra-red controls were used to regulate the size of the flame and the rate of waterquench. The same process when carried on a few more steps is the basis of the Fischer Tropsch process for making synthetic fuels and lubricating oils. In the quench process carbon monoxide is also produced. Carbon monoxide is forced under pressure and with the aid of catalysts into olefinic molecules giving rise to long chain paraffins, suitable for lubricants and soap manufacture.

America is approaching that state of natural raw material supply that faced Germany at the outset of the war. Our reserves of oil appear to be dwindling. It is anybody's guess when the supply will get dangerously low or the cost of production too high, but it is a good guess that another war would seriously tax our supply. It is for that reason among others that we have become conscious of Reppe chemistry. Through the use of coal and natural gas, supplies of which appear to be ample, when production is not hog-bound with strikes, and using Reppe chemistry along with Fischer Tropsch processes we have at hand a means of augmenting our oil supply.

If we adopt the quench process for making acetylene we also have a cheap source of acetylene and all the products resulting from acetylene and carbon monoxide syntheses become ours for a fraction of what they would cost otherwise.

Reppe has done much toward dispelling the fear of using acetylene under pressure, but we must be ever mindful of the fact that he has not through some special magic of his own changed acetylene from a highly explosive chemical to a harmless gas. Far from it. Acetylene did and still will explode and under certain instances, much too frequently encountered, detonate. He has only shown the steps that can be taken to minimize the chance of explosion.

Reppe has contributed much to the field of catalysts. He takes pride in pointing out that in the process for making carboxylic acids there are several American patents but that the processes were failures because of improper catalysts. In a lecture he states the following, and again I quote:

SYNTHESIS OF CARBOXYLIC ACIDS

"The Americans have closely studied the synthesis of carboxylic acids from olefins, carbon monoxide and water. The extensive patent literature suggests the use of various catalysts which practically cover the entire periodic system. It is unknown if the Americans had any technical success with these synthesis which before the war were just in experimental stage. On account of our work we can say, however, that by the use of carbonyls, especially so of nickel carbonyl, we obtained quantitative yields under mild reacting conditions. The Americans did not recognize the economic advantages of the use of carbonyl catalysts and they called the use of halides of nickel and cobalt unsuitable, which as it is known give carbonyl formation with CO under pressure."

I can't quite share Reppe's denouncement of American advancement in the use of catalysts. It is very possible that many of our highly efficient uses of catalysts have not been reflected in U. S. patent literature, or elsewhere.

In this book which Reinhold is going to publish I have tried to review the entire acetylene and carbon monoxide industry in Germany. At the outset there is a detailed discussion of the several processes for making acetylene as well as synthesis gas fuels and lubricants. Following that I have gone into great length on the chemistry of acetylene. The more I worked with Reppe's work the more I became convinced that here was a gold mine of possible thesis for the budding Ph.D.'s. In many of the processes employing Reppe synthesis there are obvious defects or room for advancement.

Feeling certain that there will be many investigators who at one time or other may have synthesized one or more of the same products Reppe made, I took the liberty of listing all of his products, indicating wherever possible physical properties as well as derivatives. In several instances chemicals were isolated but their structure remains to be determined.

Reppe was active in the investigation and synthesis of cyclopolyolefins, particularly cyclooctatetraen. Were I an organic chemist with a liking for research I believe that I would carry

out some of Reppe's experiments in cyclopolyolefins. This field appears to open new types of dye intermediates, pharmaceuticals and odoriferous agents.

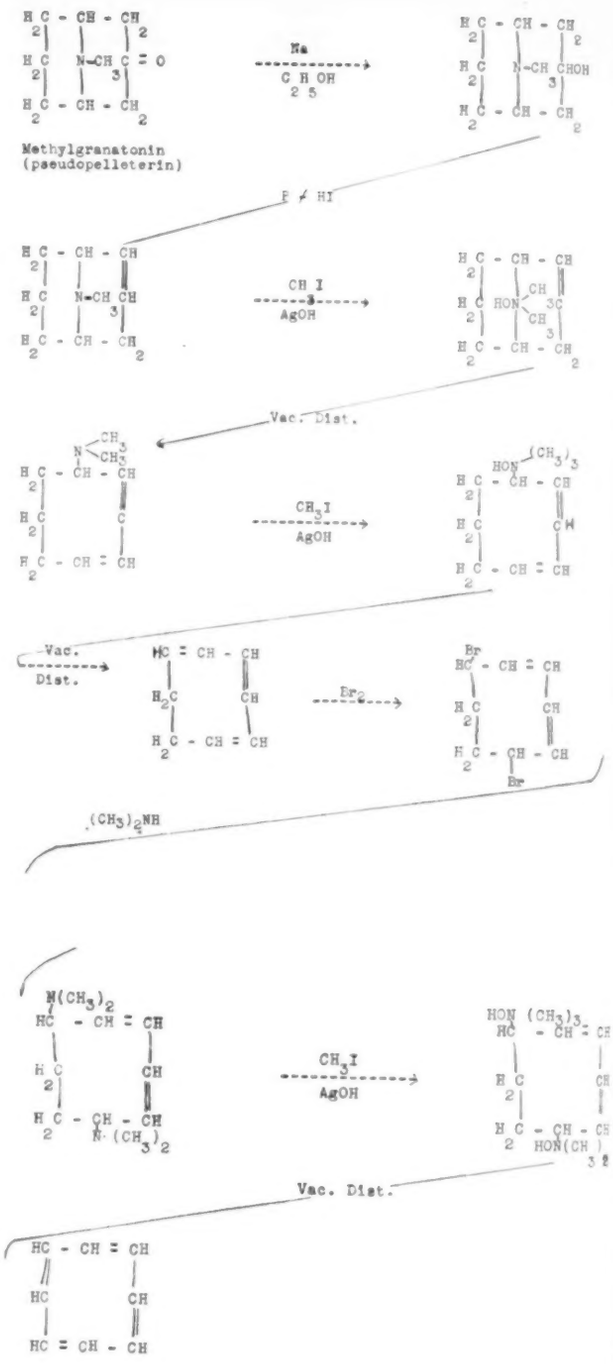
On the other hand I am certain that industrial laboratories will want to investigate the new approach to polyamides and polyisocyanates. Here we have a group of plastics similar to nylon in properties.

At a time when we should be talking about peace, national preparedness should not be forgotten and therefore it is not remissant to point out that the equipment and processes based on Reppe chemistry can be changed over from peacetime use to the production of materials vitally needed in warfare. To prove my point, let us just look at one simple reaction, namely that of acetylene with formaldehyde. For wartime use this reaction is the key for the production of buna rubber. The first step in this reaction yields butinediol. This chemical is hydrogenated to butadediol which in turn is dehydrated to butadiene. Butadiene is polymerized with styrene and buna results. At any stage in the process the reaction may be stopped and the resulting product used as a base for other synthesis. In a previous issue of the *Chemical Corps Journal* we have shown in chart form many of the chemicals that can be derived from this simple reaction. There is no need to reproduce it here. We need only say that the products include plastics, glycerine substitutes, surface coating resins, elastomers, drugs, solvents and pharmaceuticals.

The organic research chemist will be interested in the Reppe synthesis of cyclooctatetraen, C_8H_8, as compared to the tedious method employed by Willstaetter. The latter obtained a few grams of the chemical by starting with an alcoloid, pseudopelleterin, found in the pomegranate tree and submitting it to a series of chemical reactions.

It will be noted that ten tedious steps were involved to obtain the chemical, hence it naturally was a laboratory rarity.

Now let's look at how Reppe prepared this chemical.



An autoclave is partially filled with tetrahydrofuran as a solvent, made by reacting acetylene with formaldehyde. A small amount of nickel cyanide is added along with a slightly larger amount of powdered calcium carbide. Air is removed from the autoclave by flushing it with nitrogen. Acetylene gas is pumped into the autoclave until no further absorption is obtained. The brown solution resulting is filtered and distilled and a 60-70 percent yield of cyclooctatetraen is obtained.

There is no need in this article to discuss at length the theory of the catalytic action, although it has been worked out in detail and checks very well with the apparent course of the reaction.

Is cyclooctatetraen just a laboratory curiosity which can now be made in quantity? Reppe seems to think that will not be the case. He

states "on the basis of preliminary work it is possible to prophesize that C_8H_8 will be of considerable technical importance in the near future. This is a new, relatively cheap basic chemical for industrial organic chemistry."

Some possible fields for C_8H_8 may be anticipated.

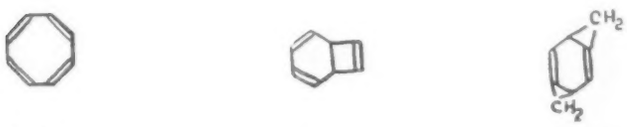
Its diene addition products are starting materials for outstanding lacquers. It can be made to produce suberic acid which is of interest in polyamide resin chemistry. Above all, the interesting cyclooctene made from C_8H_8 is capable of being submitted to all the reactions of ethylene chemistry opening a new field of eight-membered ring compounds.

It appears that C_8H_8 will be the starting material for a large number of alkaloids and pharmaceuticals. Likewise some of the derivatives of C_8H_8 are highly odoriferous.

C_8H_8 even in small quantities absorbs ultraviolet rays hence it may be used in skin protective creams.

Dr. R. Kuhn, a Nobel Prize winner, found that $C_{12}H_{12}$, another cyclopolymer similar to C_8H_8, stopped inflammation of the body tissues and checked the growth of certain pathogenic bacteria. Reppe was unable to verify this work, nevertheless this observation is a valuable clue which should not be overlooked.

Cyclooctatetraen is an interesting chemical in that it will react as if it had three different forms or isomers as shown below:



Type I Type II Type III

It is through reactions of Type II that cyclic four-membered compounds may be made, including cyclobutane.

To show the ramifications of the use of acetylene I might cite the use of acetylene as a starting material for plastics.

Some of the major plastics made in Germany were vinyl polymers, polyethylene, and polyamides. These were all made starting with acetylene. In most cases the process was very simple. To cite examples we may choose the vinyl polymers and polyethylene.

To prepare vinyl polymers, such as polyvinyl chloride, acetylene is reacted with hydrochloric acid. This produces the vinyl chloride monomer. The monomer is then polymerized in special kettles and the plastic produced is either a tough, flexible waterproof film or a molding compound. Polyvinyl chloride pipes and valves were tried to a large extent in their new chemical plants primarily because of the resistance of polyvinyl chloride to corrosion.

Polyethylene is made by hydrogenating acetylene to ethylene. The ethylene is compressed to 25,000 psi and polymerization takes place. The process is inexpensive and continuous.

Some of the facts learned about German plastics may well be adopted by our own country.

In closing this short informal article, I would like to point out that German chemical engineering has undergone quite a face-lifting in the past few years.

When I visited Germany several years ago I was shocked by the backwardness of their chemical engineering activities. The chemical plants were nowhere near those of our country in type of equipment and utilization of continuous processes. Most of the processes had hardly grown beyond the washtub stage.

Now that is not the case. I can be criticized for saying that the German chemical industry of recent years indicates a better use of chemical engineering principles than American industry, because obviously I have not had the opportunity of seeing the inside of our major American chemical plants. I can say, however, that from what I have seen the German industry has at least approached our levels.

It was interesting to see that in German plants built during the latter phase of the war there was no evidence of the use of ersatz materials. It is true that stills and other equipment were built of common steel and lined with noncorrosive materials, but such a practice is good sense. I was highly impressed with the high degree of cleanliness in the newer plants. Of course in many of the Reppe processes cleanliness was imperative. Dirt and high catalyst efficiency just don't go together.

I have given some thought as to what the future of Reppe synthesis holds for us. I am convinced that Dr. Reppe should be allowed to continue his research activities. In view of the man's high patriotic sympathy to his homeland, it would serve no useful purpose to bring him to the U.S.A. It would be disastrous, even if he were willing, to have him work for the Russians. The obvious answer is to establish a research

(Continued on page 42)

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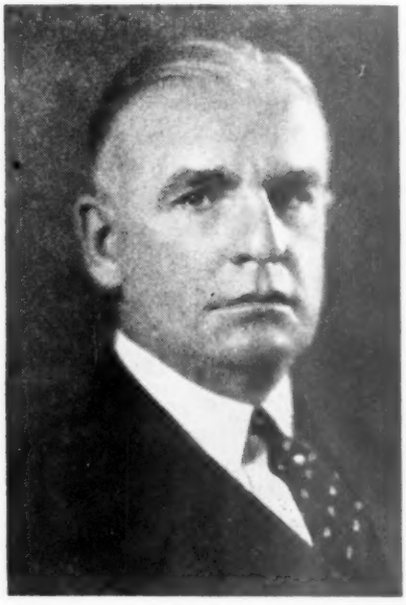

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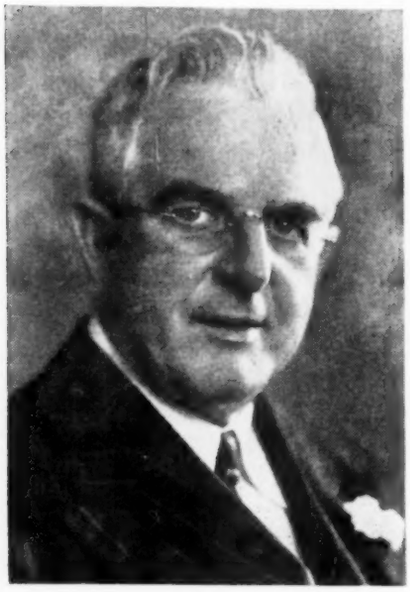

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1947-48 Membership Program

ANTHONY E. D'ANGELO
Vice President, Membership and Organization

The recently concluded Second Annual Convention at Edgewood Arsenal of the Chemical Corps Association was successful from every standpoint. The interest in the affairs of the organization as shown by all who attended was well evidenced by the numerous questions regarding a membership program for the year 1947-48. In fact, so many questions were asked and such interest was shown regarding membership that it was almost tantamount to a mandate being delivered by the membership at the convention that a definite program be established and published. In compliance with this mandate, the following program has been established: Your membership chairman and his committee will immediately check all available membership records at National Headquarters to correct, wherever possible, all errors, omissions, and/or duplications of members' names, addresses, chapter affiliation, expiration date, etc. The membership cards at National Headquarters are now in the process of being segregated as to localities and will be sent to the various chapter secretaries for their assistance in correctly tabulating a new membership listing. Boundaries of territory allocated to the various chapters will be determined by the membership committee and ratified by the Executive Committee. Where it is evident that a group of members at present assigned to a chapter fall within another geographical location which is clearly distinctive from their present chapter's geographical location, every effort will be made to assist this group of members in organizing a new chapter within their own geographical location. As a sample of this, we might cite the present condition of the New York Chapter where, during the early stages of organizing, all members residing within an area of 50 miles of New York City were automatically assigned to the New York Chapter. A cursory examination of the membership records shows a large group of these members residing in Westchester County of New York State and in the northern counties of the State of New Jersey. From the number of requests received by members residing in the outlying sections of so-called centers of population, it is evident that considerably greater interest in chapter activities will be forthcoming when these members can attend meetings close to home; therefore, every effort will be made to assist these groups in organizing local chapters. From conferences and conversations held with the members of several large chapters, it has been determined that this action will in no way harm the larger chapters nor restrict their activities or growth, but, on the contrary, will tend to induce these chapters to greater efforts in obtaining members within their own territorial boundaries to replace those members which they will voluntarily cede to those new chapters being organized.

The next phase of this program applies to the formation of student chapters at all colleges, universities, etc. Where a college or university falls within the territorial boundary of a local chapter, that local chapter will be requested to undertake the organization of the student chapter within that college or university. It is felt by the Executive Committee that these student chapters should retain their separate identities but should receive full cooperation and guidance from the local regular chapters of the Association. The Executive Committee, therefore, has recommended that the question of reduction in student membership fees be voted upon at the next board of directors meeting to further this activity.

To round out the membership program, the membership committee is revising the membership card system maintained in the national office. In effect, this reorganization will be as follows: The membership cards will be printed in strips of four, with each of these cards being detachable from one another and all bearing the same identification number. The first card on this strip is the Official Membership Card showing the member's name, address, chapter affiliation and expiration date. This card will be forwarded directly to the member upon receipt of dues. The second card on this strip is identified as the Chapter Membership Card, showing identical information as outlined on the member's card, and this card will be forwarded directly to the chapter secretary. The third card on this strip is identified as the Magazine Card. It will contain the same information shown on the member's card and it will be forwarded immediately to the magazine editor as his authorization for fabricating an addressograph plate and mailing out a one year's subscription to the magazine. When the editor has made up an addressograph plate from the information obtained on this card, he will use this addressograph plate to stamp a

(Continued on page 62)

A Non-Freezing FS Smoke Mixture

By R. MACY

From the close of World War I to 1930 the Chemical Warfare Service used titanium tetrachloride (FM) as its principal smoke-producing agent to be disseminated by airplane spray. However, toward the close of World War I the Allies had experimented with a solution of SO_3 in chlorosulfonic acid (the mixture known as FS), and the investigation was resumed in 1930 when it was realized that the FS mixture was more easily procurable and less costly than FM, and not seriously corrosive when in the form of smoke. After a few casual tests it was decided to procure a mixture containing about 70 percent SO_3 in $HCl \cdot SO_3$ for large-scale investigation. It was assumed that this solution would not freeze at —20°, but when the material arrived in cold weather, packed in 55-gallon drums, it was found to be largely solidified. It is not possible to completely liquefy an FS mixture once crystallization of the SO_3 has taken place. It is the purpose of this article to describe the work done in finding a satisfactory FS (55% SO_3 and 45% $HCl \cdot SO_3$, by weight) which will not freeze to a crystalline state in unopened drums.

No work on the Phase Rule properties of this mixture is contemplated by the Chemical Corps beyond that described in this note, but it is believed that a further study of the system especially completion of Fig. 1) would be a desirable problem for a graduate student.

Sulfur Trioxide.—LeBlanc and Rühle[1] aptly referred to this compound as a chemical chameleon which occurs in four modifications, and Smits[2] concluded there are three modifications. It is generally thought, however, that there is an ice-like form called *alpha*, which melts at 16.8°, and an asbestos-like form called *beta*, which is said to melt at 60°. The latter is the commercial variety; it does not melt completely, but softens and sublimes over a wide temperature range. (In an advertisement of "Sulfan" in Chemical and Engineering News, 19 May 1947, the General Chemical Company listed the modifications and melting points of SO_3 as follows: *gamma* 16.8°, *beta* 32.5°, and *alpha* 62.3°.)

Chlorosulfonic Acid.—This compound melts at —82°, boils at 155.3° and decomposes only slightly into its constituents at the boiling point.

[1] LeBlanc and Rühle, Ber. Sachs. Ges. Wiss. 74,106 (1922).

[2] Smits in Mellor's Treatise, X, 331-361 (1930), Longmans, Green.

Filling an Airplane Spark Tank with Non-freezing FS Smoke Mixture

The System: Sulfur Trioxide-Hydrogen Chloride.—From available information the relationships in this system can be outlined as shown in Fig. 1. The compound $HCl:SO_3$ is represented by the vertical broken line; the compound contains 68.7 percent SO_3. Point A is the melting

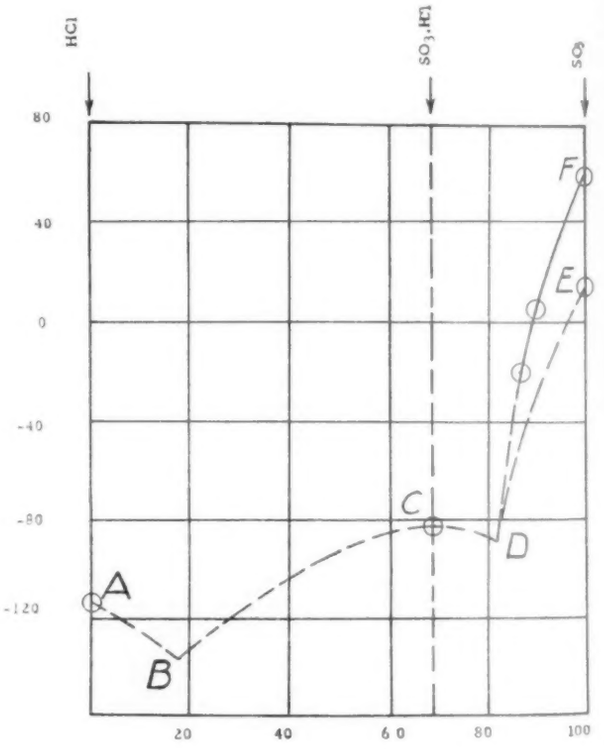


Fig. 1.- The System: Sulphur Trioxide - Hydrogen Chloride. (Largely hypothetical, based on available data.)

point of HCl, generally accepted as about —114°, and curve AB gives the solubility of solid HCl in the solution. It is not known if HCl and SO_3 form other compounds than the 1:1 compound,

but it is not likely. The compound $HCl \cdot SO_3$ which melts at —82° in all probability has a congruent melting point as indicated by point C. There should then be an incongruent melting point at D, where SO_3 appears as solid phase. It remained to determine the nature of curve DF; this is described in the Experimental part. The point F was taken as 60° for *beta*-SO_3. It is apparent from the data obtained on DF that *alpha*-SO_3 is not present in these mixtures, since the freezing point curve for the *alpha* modification is DE, with the melting point of the pure compound taken as 16° at point E. It will be seen that DF is very steep, a small change in SO_3 content being accompanied by a large change in freezing point. A solution of 55 percent SO_3 in chlorosulfonic acid has a freezing point so low that it would probably not crystallize at all because of the high viscosity of the solution at low temperatures, although it may become glassy.

The System: Sulfur Trioxide-Water.—Since water is the most probable impurity or source of difficulty in handling SO_3 smoke mixtures, it is of interest to note the possible equilibria in this system. Reference to the summary by Mellor[3] shows that numerous solid phases can be formed in the presence of water.

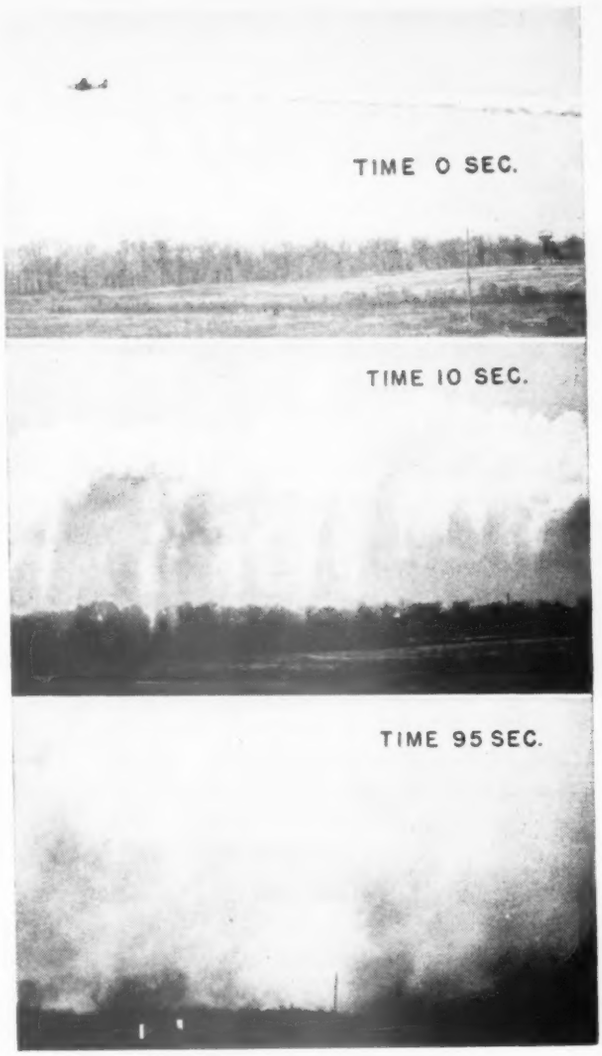
The System: Sulfur-Hydrogen Chloride-Water. From the two-component systems referred to it is possible to draw diagrams which show qualitatively the equilibria in this ternary system from ordinary temperatures down to —20° or —30°, which are of interest in this study. This note, however, will be confined largely to the binary system SO_3 and HCl. From Table I it will be seen that the effect of adding water (as 96% H_2SO_4, which converts free SO_3 to H_2SO_4) is to raise the freezing point. The introduction of water in the form of H_2SO_4 probably sets up ternary equilibria[4] involving either solid H_2SO_4 (m.p. 10.3°) or solid $H_2S_2O_7$ (m.p. 36°).

Experimental

Preparation of Samples.—Because of the difficulty of handling SO_3, only mixtures of SO_3 and HCl were studied which could be prepared by adding $HCl \cdot SO_3$ to a 68 percent solution of SO_3 in $HCl \cdot SO_3$ obtained from the Merrimac Chemical Company. Dilutions were made with $HCl \cdot SO_3$ redistilled from the Eastman Kodak "Practical Grade." When solutions containing water were needed for certain experiments, the water was added in the form of 96 percent sulfuric acid of CP quality. The composition of such solutions could be checked by determining Cl, free SO_3 and total SO_3, calculating the Cl as chlorosulfonic acid and estimating water content by difference.

Freezing Point Data.—Because of the rapid rate at which these solutions absorb atmospheric moisture it was found necessary to make the determinations in flame-sealed Pyrex test tubes. A typical experiment is as follows:

Expt. 5b.—The 55 percent solution of SO_3 in $SO_3 \cdot HCl$ was kept at —30° for 4 hr. but failed to crystallize. When the temperature was lowered to —70° it became non-fluid and glassy. (A 60 percent solution of SO_3 from Expt. 5a in the same bath at —30° started to crystallize in 10 min.)



Formation of an FS Smoke Curtain.

[3] Mellor, p. 352 in Ref. 2.
[4] loc. cit.

TABLE I

Freezing Points of Sulfur Trioxide Solutions in Chlorosulfonic Acid (Dry and Wet)

Expt.	Composition by wt. %SO_3	%SO_3·HCl	%H_2SO_4	Approximate Freezing Point °C.	Density at 26° g./cc.
....	100	0	0	....	1.955*
1, 4	68	32	....	+ 5	1.925
5a	60	40	....	—20	....
5b	55	45	....	below —30	1.909
5c	50	50	....	below —50	....
6a	58	27	15	—25	....
6b	42	23	35	above 0	....
....	0	100	0	....	1.748

*Extrapolated.

Density Measurements.—The densities listed in Table I were obtained at 26° with a specific gravity bottle of 49.59 cc. capacity. Although the data were too few to provide an accurate extrapolation to the density of pure SO_3 the density was taken to be 1.955 (somewhere between 1.95 and 1.96). This is in good agreement with the corresponding values of 1.947, 1.958, and 1.960 calculated from the data for SO_3 recorded in *International Critical Tables.*[5]

The density of the *alpha* form of SO_3 is somewhat lower than that of the *beta* modification. Mellor[6] cites values of 1.902 and 1.904 at 25°.

The density obtained for chlorosulfonic acid at 26° falls on the straight line function drawn through the data cited by Miles[7], namely, 1.785 at 0° and 1.549 at 155.3°.

The density of a sample of the 55 percent SO_3 solution in $HCl \cdot SO_3$, drawn from a drum that was part of a large manufactured lot, was measured from 0° to 55° in dilatometer. The data fell on a straight line from which the following data points were read: 1.967 g./cc. at 0°, 1.915 at 25°, and 1.849 at 55°.

[5] International Critical Tables, Vol. III, p. 22, McGraw-Hill Book Co., N. Y. (1928).

[6] Mellor loc. cit. p. 341.

[7] Miles, Manufacture of Sulfuric Acid, Vol. IV of Manufacture of Acids and Alkalies, by Lunge and Cummings, D. van Nostrand (1925).

MAJOR BURN HEADS BUSINESS MANAGEMENT DIVISION

The appointment of Major Richard C. Burn, Chemical Corps, of Marmaroneck, New York, as Chief of the Business Management Division at the Army Chemical Center, Edgewood Arsenal, Md., was announced April 15th by Brig. Gen. E. F. Bullene, Commanding General.

Educated at New York Military Academy and Duke University, Major Burn was called to active duty as a second lieutenant in March 1941.

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Below is a representative list of chemicals now being processed in Vulcan plants or equipment:

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Methanol—from wood distillation
Ethanol —industrial grades from molasses and grain
Ethanol —from sulphite waste liquor and wood waste
Ethanol —anhydrous, Vulcan process
Ethyl alcohol—beverage, neutral spirits
Isopropanol
Allyl alcohol
Butanol

ACIDS
Formic acids
Acetic acid—from wood distillation
Acetic acid—from process residues and solvent recovery
Acetic anhydride
Propionic acid
Butyric acid
Stearic aid

ESTERS
Methyl acetate
Ethyl acetate
Butyl acetate
Vinyl acetate
Dibutyl phthalate

KETONES
Acetone
Methyl ethyl ketone

ALDEHYDES
Acetaldehyde
Butyraldehyde
Furfural

GLYCOLS
Ethylene glycol
Butylene glycol

ETHERS
Ethyl ether
Isopropyl ether

PHENOLS
Phenol
Naphthol

HYDROCARBONS
Butadiene
Heptane
Benzene
Toluene
Styrene
Diphenyl

MISCELLANEOUS
Citronellal
Geraniol
Essential oils

CHLORINATED HYDROCARBONS
Chloroethane
Chlorobenzenes
Chlorotoluenes

VULCAN
DISTILLATION
EVAPORATION
EXTRACTION
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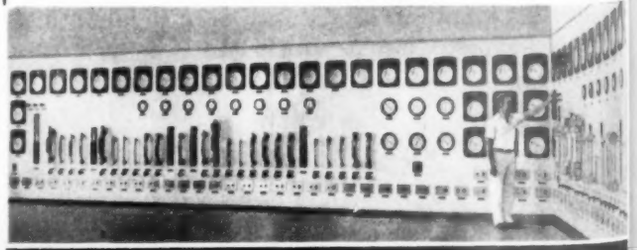

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OBJECTIVES AHEAD

(Continued from page 3)

way affect their receiving their normal vacation time, alter their seniority, pay, etc. During the "military leave" the employee would continue to receive his regular pay from the company and, in turn, would turn his military pay over to the company. Or he might keep his military pay if it is greater and receive no pay from the company.

We have already advocated and will follow up the establishment of intensive two-week Army technical courses by the Chemical Corps and other technical services. Highly trained technical personnel should spend the greater percentage of their two-week military training periods in appropriate Army technical centers and laboratories. Here they can be briefed in current Chemical Corps problems and can make contributions from their own experience and knowledge. Personnel should receive military training during peacetime in keeping as nearly as possible with the type of work they would perform under conditions of war.

Industrial mobilization policies established by the War Department will receive our keen support. At the same time, we will keep the War Department aware of our members' opinions and suggestions regarding improvements which might be made in the Industry Mobilization Plan.

We will expect most of the Chemical Corps chapters to become more active during the next twelve months. Some were very aggressive during the first year. It is the opinion of the Executive Committee that a *minimum of two meetings* should be scheduled for this year and more preferably four. Our headquarters will be glad to assist you in getting speakers and contribute in any way possible towards the success of your meeting. Remember, through meetings you maintain the interest of your members. If you fail to hold meetings, your chapters will soon fall apart.

We will consider the presentation of awards to outstanding students of chemistry in certain colleges and universities.

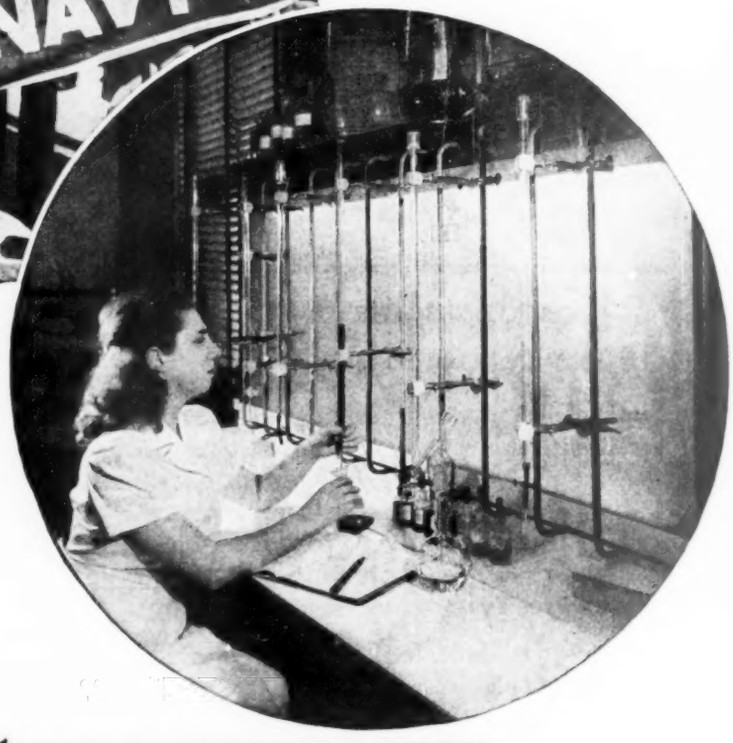
We will continue to foster all worthy measures which will benefit the Chemical Corps.

We will again favor and contribute toward an Industry-Army Day such as was held in Chicago January 17, 1947.

We will drive on and on . . . adjusting our course to encompass new goals as old goals are realized . . . striving continually and relentlessly to help build a national defense which will provide extended peace and also adequate protection in case of an emergency.

Experience rates an "E", too!

Outstanding among the factors which enabled Lambert Pharmacal Company to win 5 wartime Army and Navy "E" awards were the many years of expert experience in doing the very type of job called for. Available to the Government overnight was all the "know how" and technic of production acquired throughout more than 60 years of leadership in the mass production of pharmaceutical products.



Raw materials used by the Lambert Pharmacal Company are carefully assayed in our Analytical Laboratory. The titration table shown in this photograph is typical of such equipment used in the Analytical Laboratory. Carefully standardized solutions automatically supply the burettes used by the analyst in carrying out such assays.

For the precise determination of small amounts of certain chemicals, the spectrophotometer, shown here in use, utilizes the "electric eye". It is far more sensitive than the human eye. In pharmaceutical manufacture small amounts of contaminating materials can have a deleterious effect on the final product. The spectrophotometer is constantly used in the Lambert laboratories to determine the amount of contaminating elements in raw materials.

Rabbits have been utilized by Lambert in its dandruff research. The rabbits were inoculated with Pityrosporum ovale; which is believed by many dermatologists to be a causative agent of infectious dandruff. After infectious dandruff developed, the rabbits were treated, on one side only, with Listerine Antiseptic once a day. Marked improvement on the treated side was noted within 14 days on the average. The untreated side of the rabbit showed typical evidence of dandruff even a month after inoculation.

LAMBERT PHARMACAL COMPANY
St. Louis, Mo.

A TRIBUTE TO THE CORPS

(Continued from page 7)

Before leaving this subject may I add a word of caution. Many good projects are irremediably injured by excesses and by intolerance of other necessary activities. Do not get the idea that scientific research and development is the only—or necessarily the most important—aspect of national defense. It is a leading member of a great team, which embraces production and services and civilian and military manpower. No single player can win the game alone.

Nor must we ever forget that a war has never been won, and will in my opinion never be won, without fighting men—men today in the air and on the ground and on the sea. The prehistoric savage who first rolled a stone down on the head of a foe thought that push-button war was here. But between 1941 and 1945—in spite of all the strides of science—more men were engaged in battle and there were more human casualties than in any war in history—and most of the casualties were of men fighting on the ground.

All that I have said tonight about science applies with peculiar force to the Chemical Corps. Perhaps it fits you more than any other Service. I want to pay a tribute to your branch of the Army—a special tribute because so many people do not know how valuable your contribution was in World War II—particularly do not know of the value of your readiness without action. For not only were your products used effectively in many ways, not only did you play a positive—and an essential—part in our great victory, but also—if you will forgive a pun—you well demonstrated the old couplet: "They also serve, who only stand and Waitt."

Your proficiency in unused weapons saved many lives. There were no dollars better spent than for the equipment and material which you developed only to throw away. And so it may be in the future. It may again be the case that in some of your activities, the better job you do the less likely it is that you will have to put to actual use the products of your work.

But this will not be—and it has not been a deterrent to your best efforts. Those who have labored on unused and secret problems—which will perhaps never be fully known—may have lacked the plaudits of many people who never heard of their work—may have not received the acclaim accorded more dramatic war efforts. But they know—and they know that many leaders of our nation know—how valuable has been their service.

I would say here, parenthetically, that I have not overlooked the splendid service and combat effectiveness of your combat troops, your justly famous chemical mortar battalions which have performed so valiantly and courageously that they have been cited many times as an indispensable part of the ground combat team.

You must have production—in your own shops or by contract. You must have field tests. You must have training and practical demonstrations. Your management must be adequate and your policy-making leaders must be sound. For all of these things you need—and will get—all the assistance the Secretary and I and our associates can possibly give you.

Some few months ago your branch was under fire and criticism—much of it trivial or totally unjust. But these developments inevitably brought you and your operations to my close attention. I have followed your activities month by month. I want you to know that I have confidence—full confidence—in your organization and how it is being run. I compliment you on your accomplishments of the past year.

And now a word to you "alumni" of the old Chemical Warfare Service. You are the greatest single asset which the new Chemical Corps has. You will do more than anyone else to set the standard of its morale. Your pride in what you did during the war and your confidence in those of your old associates who are still "at bat"—this pride and this confidence is a good barometer of what the future holds for the Corps in accomplishment and service.

Your organization and its associate members have established a valuable medium through which the Army will be better able to maintain a close working relationship with the chemical industry. By the willingness of leading industrialists to join the association they have demonstrated their deep interest in the problems of national security and their desire to help keep our nation strong—and safe from threats of war.

It has been a pleasure to work with Colonel King and with your other officers and directors. I have been gratified in the lead which your present group has taken in bringing the various War Department associations closer together. This has already paid dividends—in procurement, in industrial mobilization and in general public relations.

I bespeak for the Chemical Corps and for the entire group here today a continuance of your splendid record of the past—and even a wider range of service in the future.

CHEMICAL CORPS—FROM WAR TO PEACE

(Continued from page 8)

You have read much in the past few weeks about the reduction of classified civilian personnel as a result of the so-called Byrd Law. The newspapers have been critical of the War Department's procedure. There has been, perhaps, some apprehension on the part of our workers, especially on the part of those engaged in scientific work.

I would like to announce now that so far as the Chemical Corps is concerned, I feel that we have weathered the storm and have made it clear that we consider research and development a matter of highest priority.

When the first allotments were received for the Chemical Corps, it looked as if our research organization might be severely damaged. I pointed out the dangers to General Aurand, Chief of Research and Development, War Department General Staff, and to Mr. Royall, the Under Secretary of War. General Aurand and Mr. Royall sat down with me and went over our figures. When I was able to show them what was happening, they granted me necessary increases. I am very happy to tell you now that the research and development organization of the Chemical Corps has come through this reduction intact, and to say that I feel we have been permitted to retain an organization that will enable us to carry out our mission.

This has had to be at the expense of severe cuts in other parts of the Corps. You must remember that the Army is operating under a personnel ceiling required by the law. Those of you who are not in research and development may feel that more emphasis should have been placed on the maintenance of arsenals, on training, on procurement planning. I can only say that we have done our best with what we have had to provide that organization which would yield the most for the future.

I hope that additional emphasis can be placed on procurement planning later. Right now it appears that the Chemical Corps must develop new material before we can plan its procurement on any sized scale. Rightly or wrongly, I have determined that the scientific side of the service must receive first priority. I want you to agree with me on this.

In planning for the future of the Chemical Corps, I must always keep in mind the fact that we are a technical service and that scientific research is the key to our progress. The emphasis in the Corps must be in science.

I firmly believe that the strength of our Nation today lies in science and industry. We lead the world in both, and we must maintain that leadership. I propose to do all within my power to assure that we lead the world in chemical warfare science in all its phases.

Just as science and industry have brought us to our present state of greatness, so I believe that science backed up by industry is our hope for the future. I believe through science we will be able to use our position of leadership for good and wise administration, and through science find the way to help the world to a better life.

BACK STAGE WITH REPPE

(Continued from page 31)

institute on acetylene in Germany, and let Reppe and his co-workers take over under proper U. S. supervision. I would certainly envy the person who had this latter responsibility, at least from the angle of gain in chemical knowledge. Of course the job would have its drawbacks unless one were immune to the irritating manner of prima-donnas.

Fellowship of U. S.-British Comrades

The Journal has been requested to pass on to our membership the following information about the organization "The Fellowship of U. S.-British Comrades."

Eligible to membership are all military or civilian personnel who at any time during the war served under any combined U. S.-British command, either in the Zone of the Interior or in any Theater. The purpose of the Fellowship is to maintain and further the friendly relationship and mutual regard which existed between these Allies. Headed by General James H. Doolittle, this organization has no political aims, no "causes" to advance, and its sole mission is to provide a medium whereby contacts may be maintained and fellowship enoyjed with our British Allies. The organization is set up in this country and in Britain, and eventually it is hoped to establish local branches wherever sufficient interest is maintained. Anyone interested should contact the Secretary-General, Colonel James E. Daly, at 1164 19th Street N.W., Washington, D. C., who will forward full information. Obviously a great many of our membership are eligible, and The Journal believes that many of them will find the Fellowship of interest.

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OPERATION LEASE

(Continued from page 21)

tion of equipment had processed to a point where a surprising amount of equipment had to be overhauled. For example: Of two hundred electrolytic cell anodes 170 had to be rebuilt. Hundreds of feet of pipe lines and attendant valves and fittings had to be renewed. Nearly all of some 80 pumps had to be overhauled. Some ceramic equipment had failed on standing. Rubber lined equipment had to be dismantled and shipped to the manufacturer for relining and so on until each item of equipment was dismantled, inspected and repaired under as great, if not greater, spare parts and materials procurement difficulties as existed during the war. Of particular significance is the fact that most of the chlorine-caustic plants of the Chemical Corps required approximately nine months to build. It required a great deal of effort to restart some of them in less than nine months.

Immediate advantages to the Chemical Corps exist from the lease of plants to private industry. In addition to revenue realized by the Treasury Department, there is relief from the burden of standby maintenance which was carried on under increasing difficulties due to reduction in allocation of funds and personnel. The extent of deterioration of the plants within 18 months of dormancy duplicates previous experience with World War I plants at Edgewood. A great deal of equipment was eventually disposed of as scrap due to having been deteriorated beyond further use. Plants in operation deteriorate and also wear but the necessity for continuous and effective maintenance in order to operate on an efficient basis automatically takes care of such factors. The difficulties encountered in restarting the Chemical Corps plants under lease proves the inestimable value of an operating plant in the event of a national emergency.

The advantages of the leasing concerns are somewhat indeterminate as yet. The objective is to provide immediate relief to an insatiable demand which might be otherwise lost in the discouragement of further chlorine-caustic consuming industrial expansion. A great deal of this expansion has been for the benefit of new end products whose merits and resultant demand came about with such suddenness as to quickly deflate a long existing concept of ample chlorine-caustic producing capacity in the country. The versatility of chlorine is becoming accelerated with each contribution in the field of plastics, organic chemicals, insecticides, petroleum, pharmaceuticals, and other innumerable new end uses.

Each arsenal location has economic disadvantages with respect to raw material and utility costs. Except for the war emergency, there are very few situations which have justified the installation of a chlorine-caustic plant removed from a source of salt and cheap power. Such costs will have considerable bearing on the continuity of leases for Chemical Corps when the demands for chlorine and caustic are satisfied.

The present trend of world affairs and chlorine-caustic demands are almost equally unpredictable. It is indeed a rare combination of advantages that exsits in operation of wartime plants whose products can relieve peacetime demands as well as instant wartime demands. It is to be hoped that by the time leases are terminated due to satisfaction of peactime demands, there will be no possible wartime demands.

NEW CHIEF CHEMICAL CORPS TECHNICAL COMMAND

Col. John A. MacLaughlin, formerly Chemical Officer for the Army Ground Forces, Ft. Monroe, Va., from November 1945 to April 1947, has been assigned as Commanding Officer, Chemical Corps Technical Command, Army Chemical Center, Md.

Colonel MacLaughlin was previously at Edgewood Arsenal from November 1944 to March 1945, where he served as Assistant Commandant of the Chemical Corps School and as special assistant to General Kabrich, then Commanding Officer, Technical Command, for two-month periods.

During the war Colonel MacLaughlin served under General Stilwell in the CBI theater as Theater Chemical Officer from 23 February 1942 to 6 October 1944, and was awarded the Legion of Merit.

Colonel MacLaughlin was graduated from Harvard University with an AB in chemistry.

He subsequently attended the Chemical Corps Chemical Engineering course at MIT, from which he was graduated with an MS degree in 1928.

Colonel MacLaughlin has served in the regular army since 1918.

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(Continued from page 24)

targets for flame throwers, which can kill without singeing a thread of the victim's clothes by simply using up all the oxygen in the air of the cave, and at the same time creating a very high concentration of carbon monoxide in the enclosure. The victim ceases to be a soldier quickly and painlessly.

Portable flame throwers came out of World War I as a completely discredited weapon. As Director of Research in the Chemical Warfare Service much of the time between the two world wars, I was forbidden to spend a nickel of government money on flame thrower development until 1940. But fire in quantity is a terrible weapon, and this one was not to be denied. By making a few pertinent refinements on the old German portable flame thrower, and using jelled gasoline for fuel, the effective range was made three times greater. It was the only weapon available that would "shoot 'round the corner." It was therefore highly effective against the Japs who buried themselves in caves. In the tank-mounted model it was still more effective. The one American armored flame throwing battalion did yeoman service at Okinawa, as did the Marine units on islands in the Pacific and the British battalions in Europe. Unfortunately both the portable and the tank-mounted flame throwers are terribly inefficient because so much of the fuel burns in the air between the weapon and the target, even when the fuel is jelled. What we need, and will get, are flame throwers that hurl capsules of fuel accurately and at considerable range so that the capsules burst on and in the target and all the fuel burns there. There are several ways of doing this, and it will be done within ten years in spite of all the folk who wring their hands and say, "Impossible." Get a heavier fuel that jells well, and do it up in capsules, and you will get a portable flame thrower that produces a far greater effect on a target two hundred yards away than has been possible heretofore at ranges of thirty-five to forty yards. The flame thrower has just started to develop in its modern form. In range, it is still behind the fire arrow of the American Indian or the ancient Persian archer. As for the armored flame thrower, all we have to do is to turn the cannon into a flame thrower to get an effective range of half a mile. A legal patent on a good flame thrower fuel capsule would be worth at least a million dollars!

Smoke

In 1939 we set out on a research project to produce a synthetic London fog. This was done in the laboratory after two years of work; then came the problem of devising a machine to do it in the field on a large scale. An idea was conceived, and a monstrosity of a machine was turned out that made a thin trickle of smoke that was a London fog. Having shown that a durable smoke could be machine-made by condensing a thin film of oil about a droplet of water the problems of design were not too difficult, and soon there were half a dozen efficient machines that made mechanical smoke. One of these was selected and developed into the big Esso (M1) model. Then a baby model known as the foxhole generator (M2) got a big play, and the Navy split the difference for a middlesize mechanical smoke generator known as the Besler model. These three models produced billions of cubic feet of oil-and-water smoke that covered exposed roads and anchorages from North Africa and Italy to the Pacific. Smoke came to be generated by the square mile, where before the war the unit of measure had been the artillery square, 100 yards on a side. A new chemical unit, the smoke generator company, was formed to use this new weapon. At Okinawa, smoke helped save many ships from Jap suicide pilots because these fellows could not slam a plane into a ship they could not see any more than the bombardiers could hit a target at which they could not aim. Then came radar, and clouds and smoke were of mighty little effect against area bombing. Even mortars and land artillery as well as naval guns were being laid and directed by radar. It looked as though smoke was on the way out. But the wheel of fortune spins, and no man can tell what may happen ultimately; however, for the immediate future it looks like a toss-up between a combination of smoke and "window" against radar; with a smoke eventually to be produced that will bounce a radar beam like a duck's back turning a thin stream of water. That means that smoke is going to be mighty effective in the future even against guided missiles, as well as against gun laying and bombing radars. You can't go to sleep in this scientific race or you will find your long-range missiles being returned to base instead of proceeding to the expected target.

Gas

There have been lots of guesses as to why toxic gas was not used in World War II. There were times when its use would have won battles and even campaigns: Corregidor and Bataan, for example. They were ideal gas targets. At Anzio, gas in sufficient quantity would have been the end of the beachhead. Gas on Berlin would have

been far more effective than explosives or incendiaries. For example, half a dozen bombers per week loaded with paper bags filled with solid crystals of tear gas could have dumped enough gas on Berlin to have driven the population to the country and kept them there for long periods. Tear gas would not have killed anybody, but after hours and days, the gas mask would have become unbearable, and simple tear gas could have depopulated Berlin. Large air attacks with phosgene in cold weather and mustard gas in hot weather would have created passive air defense problems of unsolvable magnitude. Once we had Okinawa as a base, and command of the sea and air, we could have depopulated Japanese cities with a hundred and fifty thousand tons of gas bombs. Frankly no combatant was in a position to use gas without a well-founded fear of retaliation against his own population until just before VJ-Day—then it was not necessary.

But gas in the future? If it is to the military advantage of one side or the other, it might well be used. Certainly all will have to be prepared to defend against it, and that is going to be some job when arsenic, phosphorus, and sulfur can be made highly radioactive and so impart this property to war gases in addition to the usual toxic qualities. This new gas certainly will be more than enough to worry the field commanders, the chemical staff officers, and the soldiers. Radioactive toxic gas may be even more effective against strategic targets than atomic bombs.

Other Agents

This brief discussion of the evolution of some of the major chemical weapons and munitions should give the reader the idea that a number of the weapons are "going to town." The Chemical Warfare Service has now become the Chemical Corps by Congressional action. Its research scientists, its troops, its manufacturing plants, its training facilities, all have major problems on their hands in keeping up with kaleidoscopic changes that are taking place in physics, biology, chemistry, and engineering, and applying these new developments to the problems of offense and defense in the field of military technique. The problem would be tough enough if there were no new weapons in sight.

That certainly is not the case, for there are a number of new weapons of major importance to all branches of the military service. For instance, there are guided long-range missiles, drone airplanes, and medium long-range high capacity rockets that may become extremely important for tactical operations and as carriers of chemical fillings of various types, especially when used with toxic gases having the extra effect of being made in part of radioactive elements. There is some possibility of using sound waves of the right length and frequency to dissipate limited areas of Aleutian fog; as well as to break down the nervous system of men and animals at a distance from the source. Of course, this will involve two different sets of gadgets.

Every great war produces a variety of new mechanical developments and chemical inventions that ultimately prove of great value to mankind, though they were not developed for that purpose. The last war produced such a bewildering variety of new things that it will take fifty years of intensive effort to perfect the right ones for war purposes and to adapt the useful ones to daily commercial life. Already we have selective weed killers and flame thrower cultivators which promise to revolutionize agriculture and gardening. It looks as if the Chemical Corps has plenty of work ahead in its field, since this Corps serves the Navy and the Air Forces, in addition to the Ground Forces.

CHEMICAL SCHOOL GRADUATES NINETEEN

Nineteen officers, students of the First Chemical Corps Officers' Advanced Class, graduated at exercises held at the Chemical Corps School on June 13 at 11 a.m., it was announced by Col. Maurice E. Barker, Commandant of the Chemical Corps School at the Army Chemical Center, Md.

Maj. Gen. Alden H. Waitt, Chief of the Chemical Corps, delivered the graduation address and personally awarded the diplomas to each officer graduate.

Those receiving diplomas for the successful completion of the 40-week course were:

Major Frank E. White, Infantry, British Army, who, having completed the course, will return to England.

From the Chemical Corps:

Lieutenant Colonels: Walter W. Kuehler and Claude J. Merrill.

Majors: Rura O. Ball, Martin L. Denlinger, William Kittel, Edward V. R. Needels.

Captains: Joseph S. Brinkley, Jr., Samuel T. Bonds, Charles A. Cain, Alton L. Kelly, Sterling P. Palmer, James A. Richardson and Howard G. Schade.

First Lieutenants: Carl R. Duncan, Bruno J. Jankowicz, John A. Pierce, Jr., and Cornelius M. Schmelzle.

From the Air Corps: 1st Lt. David W. McKinney.

Join the CHEMICAL CORPS ASS'N

⋆WHAT THE ASSOCIATION DOES:

The members of this Association, mindful of the vital importance of chemical warfare in the field of national defense, have joined together as a patriotic obligation to preserve the knowledge derived from their war experiences and to encourage improvements in science as applied to the Chemical Corps. The objects of this Association, therefore, are to sponsor new developments designed to increase the efficiency of chemical warfare means, to collect and disseminate useful knowledge with respect to chemical warfare and related subjects, to foster a spirit of good will and cooperative endeavor among its members and with industry, and to perpetuate the friendships, memories and traditions growing out of their service with the Chemical Corps. The members of this Association and its constituent local Chapters are mutually pledged to the furtherance and promotion of these objects.

⋆WHO IS ELIGIBLE FOR MEMBERSHIP:

Any person who is or may be assigned or detailed to duty with or in the Chemical Corps, whether as officer, warrant officer, enlisted man or civilian employee, or who has been honorably discharged from such duty, and any person interested in the promotion of chemical warfare preparedness for national defense, may upon approval of the Executive Committee and payment of the annual dues hereinafter specified become a Regular member of this Association.

DO IT NOW!

If you are not now a member, fill in this application and mail it today.

TO: CAPTAIN JOSEPH SCHWIMER, Secretary, Chemical Corps Association
2153 Florida Avenue N.W., Washington 8, D. C.

I hereby apply for membership in the CHEMICAL CORPS ASSOCIATION. Inclosed herewith is check or money order in the sum of:

Regular membership $5.00 ☐ Student membership $2.50 ☐
Group membership $100.00 ☐ Life membership $100.00 ☐

Of the sum remitted for dues, $2.00 is for the annual subscription for the Chemical Corps Journal, and $.50 is for the annual subscription for the Chemical Corps News.

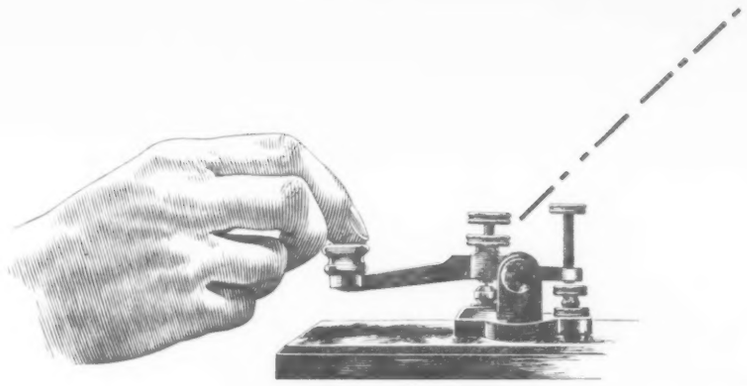
I am a citizen of the United States of America with a deep sense of the obligation of every citizen to devote himself unstintingly to the cause of our nation's defense whenever the need arises. I have a particular interest in the Chemical phase of national defense.

Military affiliation or CWS activity, if any, in World War II .....

Name .....

Address .....

City .....



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The Secretary's Corner

By JOSEPH SCHWIMER
Secretary-Treasurer

The growing importance of the Chemical Corps Association in industry is being felt. During the past year, since I have operated as Secretary-Treasurer and business manager, there hasn't been a week in which someone in industry has written in for information or for assistance in some form or other. We have done our best to obtain the correct data and furnish the assistance requested. This service is still available and we want our members to know that there is no obligation whatsoever to anyone. We do insist, however, that your request be made in writing or by telegram.

With July and August upon us, chapter activities will slow down, but these months are perfect for the officers of the chapters to get together once in a while and talk about ways and means of promoting membership drives and Fall and Winter meetings. There is no need to talk about the future except that we are coming face to face with emergencies of one kind or another and unless we are organized to handle strategic matters throughout the Chapters, we are going to be in the same boat as we were in the early years of World War II. We must keep up with the War Department activities and it is our business to keep the information before the chapters as fast as we receive it in National Headquarters.

While our second annual meeting was a complete success, your secretary continues to receive valuable tips from industry as to how far it is willing to cooperate with the War Department. Many industrial leaders have offered their personal assistance in the matter of working with procurement and plant problems and it is our plan to present their views direct to the War Department. However, we want the comments of our members concerning some of them and it is our intention to send to the Presidents of all the Chapters, any concrete proposals for their comments and suggestions.

One suggestion in particular, which will be taken up by our President, Ludlow King, is that plants and facilities in the expansion stage be made known to the War Department. If the War Department deems it advisable to investigate the potential production of a plant as it might pertain to war production, then industry might be willing to revise its expansion program and seek military counsel as to the type of construction that would be most secure in time of war. The writer of this suggestion pointed out that industry probably does not give enough attention to security during war or for any surprise attack, and that it would be in the best interests of the company to take up such matters with the proper War Department authorities. Mr. King is going to pass this information along with the expectation and hope that the industrialist advancing these thoughts may come to Washington and elaborate on them.

Certainly, there are many of you in the field who have had brainstorms or ideas that might fit into the War Department's planning. Why not send them in now for discussion by the Industrial Mobilization Planning Committee?

Dugway Proving Ground is closed. Its personnel will be scattered all over the country and we wish each and every one of the employees and military personnel, the best of luck. They had an active chapter and we are going to miss communicating with them. However, John Crossen, Secretary, writes that every member of the Association declared that he wants to continue to keep up with the Association no matter where they may be.

Chapter news will carry all the dope on some of the chapter activities. We hope that all chapters will earmark some stories for future editions of the *Journal*.

I am not going to bore you with the usual promotion slants, but don't forget to boost your membership lists. I plan to make a few trips this summer, but the Executive Committee is anxious to see the membership rise substantially, so won't you all help me?

During the summer, advertising falls off, but we're counting on everyone to give us a lift for the October and 1948 issues of the *Journal*. We need this support.

I want to express my gratitude to all of you who have helped during my first term as Secretary-Treasurer and I look forward to many more pleasant hours with you in this next year. The Association will have headqarters set up at the Hotel Pennsylvania during the week of September 15, 1947, when the ACS meets.

We want you to drop up and see us. We hope to have a big crowd visiting the hotel so come in and rest whenever you feel like it. Many of your old friends will be there. The American Chemical Society expects one of its biggest convention crowds in history. Look for our room number on the bulletin board.

Good fishing and good hunting to you all.

Pardon Us Department

OMISSIONS

The following names were omitted from the April *Journal* membership directory:

Lt. Col. Wilmer G. Wainwright, 735 Johnson St., Winona, Minn.

Mr. Norman M. Bouder, Edgewood Arsenal, Md.

Mr. John W. Stockett, Jr., 312 Fourth St. S.E., Washington, D. C.

Mr. George E. Johnson, Veterans Administration, Moorhead State Teachers College, Moorhead, Minn.

Mr. John P. Andersen, P. O. Box 217, Mound, Minn.

Mr. Francis A. Arterburn, Derby, Colo.

Mr. Natale Boggio, 1747 Tremont Place, Denver, Colo.

Mr. Bruce B. Bon Durant, 63 Myers Circle, Denver, Colo.

Mr. James L. Branch, 2119 California, Denver, Colo.

Mr. Robert G. Burge, Box 113, Fort Lupton, Colo.

Miss Jacquellyn M. Burgett, 1554 Logan St., Denver, Colo.

Mr. Anthony Canzona, 1745 West 36th Ave., Denver, Colo.

Mr. Lewis L. Cobb, 704 E. 17th Ave., Denver, Colo.

Mr. Donald H. Douglas, 420 Downing Street, Denver, Colo.

Mr. William S. Ehnie, 1826 Penn. Street, Denver, Colo.

Lt. Clyde L. Friar, Casual APO 503, San Francisco, Calif.

Mr. Alvin Grant, 1644 Lincoln Street, Denver, Colo.

Mr. Willard J. Guy, 1892 High Street, Denver, Colo.

Mr. Ross V. Hare, 175 S. Jackson St., Denver, Colo.

Mr. Glendon B. Hendershot, 3126 Quitman St., Denver, Colo.

Mr. Paul J. Johnson, Evergreen, Colo.

Mr. Albert Kercher, Box 25, Adams City, Colo.

Mr. George E. Leiker, 1108 S. Clarkson, Denver, Colo.

CWO Earl R. McIver, 3720 Gaylord, Denver, Colo.

Mr. J. R. McLaughlin, 1080 10th, Boulder, Colo.

Miss Mildred E. Madison, 633 20th Street, Denver, Colo.

Mr. Ralph Miller, 2296 Harlan, Denver, Colo.

Mr. H. F. Peak, 2928 York St., Denver, Colo.

Mr. Joe Pelliene, 4872 Alcott, Denver, Colo.

Mr. Francis R. Powell (address unknown).

Mr. Earl L. Sherer, 1320 Stout, Denver, Colo.

Mr. Frank B. Wells, 1938 N.E. 37th Avenue, Portland, Ore.

Capt. Bruce M. Whitesides, Camp Kilmer, N. J.

CORRECTIONS

Pittsburgh Coke & Chemical Co.: Mr. R. M. Marshall, Mr. G. E. Dignan, Mr. F. D. Schreiber, Mr. J. W. Zabor, Mr. J. C. Cooper, Mr. S. C. Colbeck, Mr. J. F. Matejczyk, Mr. W. E. Winsor, Mr. H. J. Hafner, Mr. A. J. Repik, Mr. W. M. Korneff, Mr. J. J. Zawilla, Mr. G. R. Stoneburner, Mr. H. T. Hetzel, Mr. H. L. Hillman, Mr. W. B. Brown, Mr. R. M. Moore.

The following corrections of addresses and spelling of names recorded in the April *Journal* membership directory are made:

Mr. R. P. Genereaux, E. I. duPont deNemours Co., Inc., Wilmington, Del.

Mr. H. G. Terwilliger, Ernst Bischoff Co., Inc., Ivoryton, Conn.

Mr. Quindaro S. Ball, Ernst Bischoff Co., Inc., Ivoryton, Conn.

Mr. Thomas J. McKnight, Ernst Bischoff Co., Inc., 2721 Indiana Ave., South Gate, Calif.

Mr. R. G. Bowers, Sun Oil Co., Box 920, Toledo, Ohio.

Capt. Leonard E. Wagner, Chicago Chemical Procurement District, 158 W. Harrison Street, Chicago 5, Ill.

Lt. Col. Harris Hyman, Jr., Canal Building, New Orleans 12, La.

Major Harry G. Alford, P. O. Box 685, Tampa, Fla.

Lt. Col. Victor C. Searle, Army Chemical Center, Maryland.

The Journal apologizes for omitting the foregoing names from the Membership Directory. May we emphasize, however, that we need your support in obtaining correct addresses or address changes immediately. If for any reason whatever a name or address fails to appear or appears incorrectly, please let us know by return mail. We shall be only to glod to send literature to any member on receipt of notice that the issue failed to arrive.

(Continued from page 13)

amounts of blood can be obtained, as with infants. It saves time as well as material.

In the Chemical Corps we study intensively thousands of highly toxic compounds. In order to develop protection we must know about every agent which could be used to destroy life of animal, man or plant. It is inevitable that in our study of toxics we must produce technics and materials of great value to medicine.

At Edgewood Arsenal we have one of the finest laboratories for toxicologic research in the world, and our scientists working there have discovered that a number of the compounds that could be used to destroy life can be applied to cure disease.

For years mustard gas has been considered our most important chemical agent. We sent tons of it overseas in bombs and shells and in bulk containers. Many will recall that in 1943 the Germans attacked the Port of Bari in Italy and sank a large number of ships in the harbor. One of the ships hit by the bombs was a freighter which was loaded with mustard gas munitions. The freighter was blown up and sunk. The mustard gas released mixed with fuel oil and floated on the water. Men swimming in the water were burned with the mustard and there were many casualties. The doctors reported that the victims appeared to be in a state of shock that did not respond to treatment and later found that there was a definite reduction in the white blood corpuscles. As soon as this report was received, work was started at Edgewood Arsenal, the effects were reproduced in test animals, and it was immediately apparent that reduction in white blood cells was caused by the mustard gas. At once our scientists saw the possibility that mustard might benefit diseases in which there was an abnormal increase in white blood cells. Some of the new nitrogen mustards that they were working with showed greater blistering powers than the ordinary mustard, so they examined these and found that they were even more destructive of the white corpuscles, especially of the lymphocytes.

The important clue had now been given them, and it was only a step to try mustard-type agents on those diseases of the blood which are accompanied by an increase of white blood cells in the blood stream or glands. They were tried on Hodgkin's disease. The treatment seems to offer promise. There have been no cures yet, but the treatment gives improvement similar to that with X-rays. A hopeful new avenue of research has been opened and this chemotherapy is now being investigated by the Committee on Growth of the National Research Council. There are over 100 Nitrogen mustards that have been synthesized. Only a few of these have been tried as yet, but the work is going on.

However, the contributions to world betterment from military science are incidental. Our main job in the armed forces is National Security. Science is going to play a greater part in the future in helping to build a stronger national defense system than it ever has in the past. The only realistic pathway to world peace is one that keeps this nation strong enough so that our science can do its share to bring about this peace. Unless this is done and real unity is brought to mankind, we must maintain the peace by using every possible scientific development to provide us with the most powerful means of national defense available. That is why I have determined that the Chemical Corps must have the best possible research and development organization that can be provided. I believe in the chemical weapon and its future. The past war rather than outmoding toxic agents has brought developments in toxicological warfare of such increased power that no informed person today believes that our agents are out of date. I believe that our Chemical Corps weapons are important weapons of the future in the say way that the atomic bomb is an important weapon of the future.

In closing, let me return just once more to my subject, "Science for Peace and National Security." I am confident that world peace will come eventually and that it will come through advances in science. I am afraid, however, that that time may not be in our generation. It lies in the future. Although we can't win the peace with armies, we can keep the peace for a time by being strong. As long as wars are possible, we must lead the rest of the world in scientific military developments and be prepared at all times to maintain our peace by having the most effective means to defend ourselves. If we are properly prepared, we shall not have to resort to war. We must insist on a Research and Development program for our Army and Navy that will guarantee us the best national defense in the world. I am confident that American science can assure this.

While we work to make the world a better place to live in and to provide all peoples of the world with a better life, we must defend our own good life. We cannot let anyone take this away from us.

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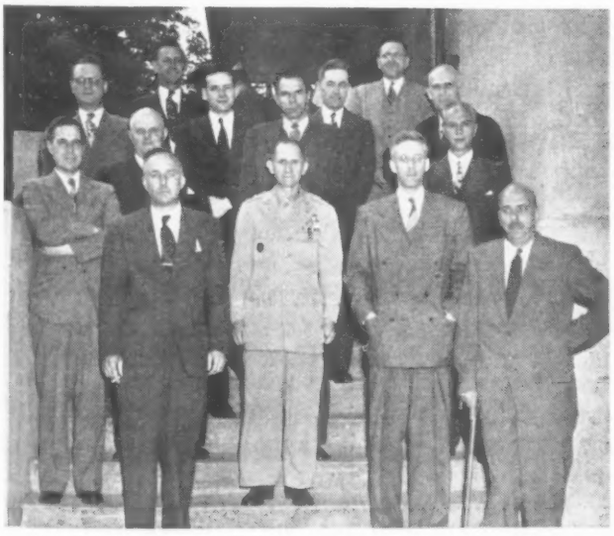

American Chemical Society Committee at 2nd June Meeting

Army Chemical Center, Md.—The American Chemical Society Committee, who act as consultants to members of the Chemical Corps, shown above at the June 2 meeting of the committee at the Army Chemical Center, Maryland, are advisors on chemistry and chemical engineering problems.

Front row, left to right: Dr. Arthur Cope, Cambridge, Mass.; Dr. W. A. Noyes, Jr., Chairman, and President of the American Chemical Society; Maj. Gen. Alden H. Waitt, Chief of the Chemical Corps, Washington, D. C.; Dr. Stanford Moore, New York City; Dr. Lewis F. Fieser, Cambridge, Mass.

Background, left to right: Dr. H. F. Johnstone, Urbana, Ill.; Mr. S. D. Kirkpatrick, New York City; Dr. Carl B. Marquand, Army Chemical Center, Md.; Dr. Charles C. Price, South Bend, Ind.; Dr. Glenn T. Seaborg, Berkeley, Calif.; Mr. Harold Weaver, Army Chemical Center, Md.; Mr. E. R. Baker, Cincinnati, Ohio; Dr. P. K. Frolich, Rahway, N. J.; Dr. W. R. Kirner, Washington.

TO THOSE WHO ARE LEFT BEHIND

Is your company one of those being left behind — research-wise — because of the shortage of experienced chemists, technicians or the right equipment? If so, we can offer you the important help you need to improve old products, processes and production methods—or to develop new ones.

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CHAPTER NEWS

CHICAGO CHAPTER

The Chicago Chapter held a meeting at the Electric Club in the Civic Opera Building on April 3, 1947, with Major Alden H. Waitt as principal speaker. The meeting was preceded by a dinner and was attended by 76 members and guests, which included Mr. George B. Dryden, President, Dryden Rubber Co.; Mr. E. J. Burnell, Vice President, Link Belt Co.; Dr. Gustav Egloff, Director of Research at the Universal Oil Products Co.; Dr. Robert E. Wilson, Chairman of the Board at Standard Oil Co. of Indiana, all of whom are members of the General's Advisory Committee. Also, Lt. Col. Carl S. Casto, Commanding Officer of the Chicago Chemical Procurement District, and Lt. Col. Warren P. Stockwell, Chemical Officer, Fifth Army.

The business session conducted immediately prior to General Waitt's speech consisted of the election of officers at which Elliott Morrill was re-elected president; Charles E. Glennon elected 1st Vice President; John E. Bruce elected 2nd Vice President, and Helen M. Tierney, Secretary-Treasurer.

In addition, George F. Croad was appointed by the president to represent the chapter as our official delegate to the coming convention at Edgewood Arsenal, inasmuch as the president would be unable to attend.

General Waitt's speech entitled, "Science for Peace and National Security" was extremely interesting and gave much food for thought to all members and guests. His remark concerning Reserve Officers and future training was extremely timely and won for him a vote of confidence from all present.

The Chicago Chapter closed a most successful year with the re-election of Elliott Morrill as President, at a regular meeting held on June 11. Brig. Gen. Edward Montgomery, Air Chemical Officer, was the principal speaker, with Col. Wittman, HQ, Fifth Army, also addressing the group.

The other officers for the coming year are: Charles Glennon, Vice President; John E. Bruce, Second Vice President; Miss Helen Tierney, Secretary-Treasurer, and the Executive Committee composed of Preston B. Heller, Frank Marks, Carl J. Beckert, Rex Cruzen and Mr. Morrill.

According to the President, the Chapter will be incorporated as the Chicago Chapter, Chemical Corps Association, and will be the first chapter to take such steps.

A report submitted by the Chapter to the Journal reads:

During the past year, after a number of monthly meetings chiefly concerned with business matters, followed by social get-togethers, we started to establish our roster of speakers. During the year we had the pleasure of hearing from Dr. Zirkle of the University of Chicago, on Radiation Toxicity; Maj. Gen. Alden H. Waitt, Chief of the Chemical Corps; Brig. General Edward Montgomery and Col. Wittman. Perhaps the highlight of our year's activities was participation in Industry-Army Day, held in conjunction with six other military associations and under the direction of the National Headquarters of the Chemical Corps Association. The average attendance was between 50 and 60 at each monthly meeting.

Our research committee is ably headed by Dr. John O. Hutchens, University of Chicago. The War Mobilization Planning Chairman is John E. Bruce and Mr. Glennon is ably handling the job of Chairman of our Finance Committee. Mrs. Marie Howell is Chairman of our Membership Committee.

During the summer, we plan on a membership drive working on a personal contact basis with each member of the Chapter being made a "Committee of One" to make contacts with names given him. It is his job to secure new members. Plans for the next year include a minimum of six meetings at which we intend to have two speakers who will come from the military, two from research organizations and two from industrial firms. We were represented at the National Convention by George F. Croad, of the Chicago Eye Shield Co., who made a most interesting report at our last meeting, and we look forward with anticipation to the coming year and the opportunity to work with our National Association officers. Our problems are simple and appear capable of solution at an early date. These include arranging for a satisfactory place where we can hold regular meetings and where the cost will be within reach of all members, particularly the younger and student members, and obtaining chairmen and workers for the Program and Pub-

licity Committees. Otherwise, we're raring to go to help keep our Association on top for another year.

The assistance we received from National Headquarters was most gratifying and the Chapter expresses its appreciation.

DUGWAY CHAPTER

The Dugway Chapter, CWA, has had an exceptionally active spring season. At the March meeting Lt. Col. Sam Efnor, Jr., Assistant Commanding Officer at Dugway Proving Ground, gave an exciting account of experiences of the 138th Chemical Mortar Battalion in the European Theater during the second World War. Several excellent speakers had been engaged for the April meeting. Lt. Comdr. James Hartung, Commander of the Navy Unit at this station, gave a very interesting talk on diamonds and other precious stones, and also gave an extensive outline of minerals and semi-precious stones found in locations near Dugway. Mr. A. N. Alexander, physicist and electronical engineer at this station, gave a very comprehensive talk on the art of cutting and polishing semi-precious stones and mounting same into gems, and exhibited many samples of cut and polished stones. Then Major W. W. Campbell, President of Dugway Chapter, gave a brief talk on the origination of Chemical Corps' installation at San Jose in the Pacific Ocean. The Program Committee, consisting of Mr. William H. Thompson, chairman; Lt. John J. Stone and Mr. Howard Lanier, deserve great comment for their effort in arranging programs and serving refreshments at the meetings.

The sad news was recently received that Dugway Proving Ground will be deactivated and closed on June 30, 1947. In that respect a farewell dinner party was held at Chris' Cafe in Tooele, Utah, for members and guests. About 30 members and guests were present. Among them were eight of Dugway Chapter's charter members, and each of them gave a brief talk for the occasion. All expressed their regrets in that the local chapter should come to an end after such brief but active existence.

With Dugway Chapter thus being dissolved, the members join in expressing best wishes for continued progress of the Chemical Warfare Association.

JOHN CROSSEN.

PHILADELPHIA CHAPTER

Early in February 1947 Col. Herb Bear invited a small group of former Chemical Corps officers to attend a dinner at the Union League in Philadelphia for the purpose of determining if sufficient interest existed to form a chapter of the Chemical Corps Association. Considerable interest was shown and a committee was named to work out the details for the organization of the chapter with power to call a meeting in June. This committee comprised Lee E. Jones, chairman; Sidney W. Lea, Paul J. Walsh, Robert E. Porter and Stanley Snyder.

The general meeting was called for June 5 at the 111th Infantry Armory and about 35 members and guests attended. Refreshments were served continuously and everyone considered the meeting a success.

Officers elected to serve one year were: Lee E. Jones, president; Warren R. Van Dyke, 1st vice president; Dr. A. B. Hoel, 2nd vice president; Paul J. Walsh, 3rd vice president; Charles W. Knight, secretary-treasurer, and Robert E. Porter, general counsel.

Col. Hugh W. Rowan, head of the Chemical Corps Board, Army Chemical Center, spoke about the importance of the Association and urged its expansion.

Joseph Schwimer, National Secretary-Treasurer, outlined the progress made since the Association started and the future role of the Association in the Chemical Corps and the national defense of the country.

Meetings are planned regularly, with a fishing trip set for the summer.

MANILA CHAPTER

The charter for the Philippine Chapter arrived last Friday, just one day prior to our monthly meeting. Conseuently, it was a very happy occasion for me that I could present the charter to the members of the Philippine Chapter at our first monthly scheduled meeting. I wish to thank you for the speed with which you forwarded the charter to me. In answer to your question with reference to whether the Chemical Corps Journal and the monthly Chemical Corps News should be sent to this office, the consensus of opinions of the members is that these items should be forwarded to the Chemical Officer, Hq. PHILRYCOM, for disposition. In the case of Lt. Colonel Zim E. Lawhon, he requests that his magazine be sent to him at 325 S. Main st., Bel Air, Maryland; auso, Lt. John W. Batchelder, who by the way is a new member, requests that his copies be forwarded to Garland, Maine.

We had a most wonderful meeting on Saturday, May 3, at which time we received four additional membership applications and the applications were accepted. Fees for these memberships will be forwarded to you by Lt. Charles M. Shadle. The meeting was held at the headquarters of the Quezon City Chemical Depot with

the principal speaker being Lt. Jesus Palusa, an officer of the 50th Chemical General Service Co. (PS). Lt. Palusa's subject was "My Services with the Philippine Army from Induction to Liberation." He did a wonderful job of describing the training he received prior to the war, his reactions on December 8, 1941, and those of his fellow soldiers, the trials and tribulations through which they went during the battle of Bataan, the Death March, captivity, guerrilla warfare, and liberation. Lt. Palusa belonged to a guerrilla unit on the island of Bohol.

I would appreciate it very much if you would expand this news bit and have it carried in the Chemical Corps News or in the next issue of the Chemical Corps Journal.

Also, at this meetingfi Captain Russell C. Lewis of the 26th Chemical Service Platoon was elected director to succeed Lt. Colonel Robert Mottley, transferred to the Marianas-Bonins Command. Enthusiasm of the members of the local chapter of the Chemical Warfare Association is a very wonderful thing to see. Their interest runs high.—LT. COL. CLARENCE B. DRENNON.

YOKOHOMA-TOKYO CHAPTER

The Yokohoma-Tokyo Chapter was officially launched on May 20 in Tokyo with Major Russell M. Tegnell, Chemical Section, GHQ, FEC, APO 500, elected President. All PO addresses are c/o Postmaster, San Francisco, in case any member wishes to write to any of the officers in that area.

Major Edward J. Holway, 10th Chemical Base Depot, APO 503, was elected 1st vice president; Capt. Sterling R. Horton, HQ, 1st Cavalry Div., APO 201, 2nd vice president; and WO (jg) Chester R. Carson, Chemical Section, HQ, Eighth Army, APO 343, secretary-treasurer.

A complete account of the meeting is coming from Tokyo, according to Col. Geoffrey Marshall, GHQ, FEC (Office of the Chief Chemical Officer), APO 500, who got the chapter off to a flying start. He was ably assisted by Colonel Burns and Major Tegnell.

We're hoping that the chapter sends us a few pictures of their activities for the October *Journal*.

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(Continued from page 10)

regard the potentials of those nations which might some day again challenge the peace of the world. We must not overlook the fact that Russia possesses some of the new and most modern German chemical plants, some of which are being operated where built and others which have been removed to Russia. Technicians have been persuaded to leave their German homes and follow these plants to operate them when they have been reassembled. There is little doubt that they will be successfully operated and find markets for their output pending the day when they might be needed for war production. One has only to contrast the average wage paid in the chemical industry in America—which is in excess of $1.50 per hour—with the cost of labor in Germany and particularly in Russia. Certainly we may reasonably expect that world markets, which are supplied by us today, will present some difficult competitive conditions, price-wise, in the future. These foreign plants form the nucleus for a great war machine as they may readily be converted from peacetime production to munitions.

A democracy such as ours has an inherent handicap in world affairs in that we, being peace-loving and desiring the acquisition of no foreign territory, assume all others to have the same desires. Consequently, in time of peace too little thought is given to preparation for defense. I firmly believe that if the United States had been fully prepared for hostilities when they were thrust upon her that neither Hitler nor his colleagues would have attempted their program. Be that as it may, had we been only reasonably well prepared, many lives would have been saved and the vast destruction of property could have been minimized.

I am not in favor of imposing our form of government on any other people. Likewise, I believe we should resist to the utmost any attempt of any foreign nation to break down our form of government and our American institutions. America was not made great by theorists, ideologists or visionaries, but by the combination of hard work, conscientious application and God-given basic resources, under a form of government determined by the wisdom of the founders of our Nation.

To be a controlling factor for peace we must in time of peace keep ourselves sufficiently strong that no one will attempt to wage another world war. Whether we like it or not, America has been placed in the position of spiritual and financial leadership among the democratic nations of the world. We cannot now refuse that leadership and for our own protection we must be prepared to defend ourselves if attacked.

Your organization, in cooperation with the Army and Navy Munitions Board, has an obligation which the chemical industry recognizes as basically essential to strong defense. If, through your efforts, this program so vital to that defense is carried forward vigorously and continuously, the Association and those responsible for the conduct of its affairs will have served the Nation well.

There is danger that many wartime developments of chemistry may be abandoned, either because they are not applicable to peacetime uses or because of the high cost of production in a normal peacetime market. Many of these should be retained and further improved against the day when they may again be needed.

The success of a war program, from a chemical point of view, depends upon getting ahead of any nation which might become an adversary. For many decades, the German scientists were leaders in the chemical field, but it was demonstrated beyond any question by the investigators who visited Germany after it was defeated that American scientists had now outstripped their rivals scientifically and in resourcefulness and ingenuity.

In war, the American Armed Forces demonstrated their superlative strength. Our industry and labor proved their ability to out-produce all the other nations of the world. The genius of management and labor, backed by mechanized production, achieved results never before contemplated.

It is hard to understand the opposition to universal military training. It is difficult to see how any thinking person could object to the expense involved in maintaining an adequate Navy and and up-to-date Air Corps and other essential military resources. As the Nation needs West Point and Annapolis, so it needs the trained manpower, facilities, productive capacity and the ingenuity to support the leadership coming from these academies. Leadership is to no avail if only untrained young men are available for combat service. Universal military training would have saved thousands of lives in the last world war and would save thousands in the next world war. In addition to this, comes the unquestioned advantage of such training to the individual. We have but to observe the great improvement in young men coming out of the services to see its value. The experience of the colleges shows that the G.I.'s are obtaining superior scholastic results

compared to men of equal age who did not have the benefit of military or naval training.

During the past war industry found itself laboring under a great handicap, that of personnel. At the same time the Government was demanding increased production and expansion of research and technical developments, key production personnel were being drafted into the Armed Forces. The chemical industry especially is dependent so much upon technical personnel that to take these men in time of war and use them for some less necessary assignment does not make sense, and this was frequently done in the past world war. I would strongly urge that if it ever again becomes necessary for this Nation to defend itself that some system be set up whereby exemption from the draft can be obtained more expeditiously and adequately. A technician is of far greater value in a chemical plant than when engaged in combat. I am not overlooking the fact that many technicians are needed in the Armed Services, but the inflexible handling of the matter in the last war should not be repeated.

To be an effective bulwark for peace, this Nation must remain strong economically and spiritually. It must effectively combat subversive influences which would destroy our form of government and render us weak. It must conduct its financial affairs on such a basis as to preclude bankruptcy. Economic waste must be avoided and a sound fiscal policy must be established. Inventive genius must be stimulated and there must be an incentive to work and produce and save. If the burden of taxation continues so heavy as to discourage effort, then our Nation will suffer to an incalculable extent.

The tens of billions of dollars that this Nation has granted to foreign nations may be warranted, but assuredly we cannot finance the whole world without dangerously weakening ourselves, and when we undermine our own financial stability, we lessen our power to defend ourselves from attack and to protect world peace.

If America must take the responsibility for defending the freedom of the nations of the world, then it would seem to be self-evident that she must keep herself in position to challenge any aggressor nation which would invade that freedom. Japan knew that the United States was vulnerable and took advantage of that knowledge. Hitler knew we were not prepared for war and made his plans accordingly. Their mistake was in underestimating the great resources of our nation, and the great resourcefulness and patriotic spirit of our people. A democracy such as ours has many faults, among them being that the people fail to realize the importance of always being prepared against attack. Being peace-loving, the national mind seems satisfied that no one else could have any different motives, this notwithstanding the experiences of the last thirty years.

It is to be hoped that the United Nations and its program will be successful, and no nation has greater hopes for that result than our own country. The greatest aid to that success will be rendered by this country in having its services and facilities always martialled and in readiness to support the policies of the United Nations. In this program your Association has no insignificant role. It is your duty and the duty of all of us to cooperate in carrying out the avowed purposes of your organization. We can do no less.

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On July 1, 1947, the Chemical Corps celebrated its twenty-seventh year as a separate and distinct branch of the United States Army.

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1947-48 MEMBERSHIP PROGRAM

(Continued from page 35)

3 by 5 index file card which he will forward to the National Secretary to be kept by him as an expiration date file so that the national office will hereafter be able to send all members a notice of expiration at least 30 days prior thereto. The editor will also use this addressograph plate to stamp the reverse side of the Magazine Card, which he will then forward to the National Treasurer for his records to allow for correct auditing of membership record books. The fourth card on this strip is identified as the National Membership Card, which will be kept in the national office to maintain an alphabetical file by chapters of the national membership. This will reduce the membership records in the national office to the following files:

(1) A master card file on which a summary of all contacts with the member, whether by mail, telephone or personal visit will be entered. This card will also show the member's name, address, chapter affiliation and expiration date.

(2) An alphabetical file by chapter of the national membership.

(3) An alphabetical expirate date file, set up to show expirations by months.

The final phase of the membership program will be to establish quotas for the various chapters as soon as the geographical boundaries have been approved. From the national records, a monthly tabulation will be published showing the full monthly membership strength and the expirations for that month. These figures will be shown in comparison to the quota assigned to the chapter by the National Membership Committee. The national office will render every assistance possible in furthering the local chapters' drive for new members and the collection of renewal dues from present members. It is intended that, by the use of the monthly expiration date file, the National Secretary will forward to the member a notice of coming expiration and a duplicate of this expiration notice will be forwarded to the local chapter secretary. New membership application blanks are now being printed and will be submitted periodically to the entire membership with a request that every member account for at least one new member during that period. No organization can hope to achieve any measure of success without a large membership.

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RESEARCH AND DEVELOPMENT

(Continued from page 20)

Engineering planning at the Chemical Corps Headquarters? Better contacts can and should be made with industry. Strengthen the Chemical Corps Headquarters personnel to better evaluate the contractual Research and Development reports. Better results and returns need to be secured from university research.

"In other words, find better qualified people to meet the job requirements. Stop making the job fit the nature of the individual. What this Association is interested in is results to attain security for the United States of America and not the personal interests of any one."

In addition to directing a letter to each member of your committee, I took the liberty of contacting Col. Charles E. Loucks, CmlC. Chief of the Research and Engineering Division. He and Dr. Robert L. Fox in turn contacted the Biological Division of the Chemical Corps at Camp Detrick and the Medical Division at Edgewood Arsenal. Unedited statements have been furnished me for use in this report. From this correspondence several facts are evident. First, and of primary importance, is the need for some degree of security to those retained to perform research and engineering work. In industry we realize that we must have labor peace and the best contracts possible are made and maintained at all times to attain this primary necessity. All employees, whether they be civil service or contractual, scientific, engineering or plain labor, cannot be kept in continual fear of layoff, salary cuts, new adverse regulations, etc. If they are, the output and quality of their work is affected adversely. Facilities that are adequate come next. If the materials found and developed cannot be tested on a large scale to determine their effectiveness they are of no practical value to anyone. This is especially true in times of great emergencies. Now for a moment let's assume that we have contented, skilled and able personnel, plus adequate facilities. What good are they if procurement is tied down and requires months for making the decision to purchase the supplies for conducting the program? Next, no matter how good your own organization happens to be, good consultants are needed. They are needed now, not after the next war starts. These four factors, let me repeat—contented qualified personnel, adequate facilities, rapid procurement and skilled consultants—are the four items needed if the program is going to have any chance of success. My apologies are offered if I have misinterpreted the correspondence furnished me by those responsible to the Chief, Chemical Corps. I'll admit it has been condensed to the bare fundamentals required.

Now that you know the feelings and thoughts of your Research and Development Committee, plus those actively engaged in the present research and engineering program, the following recommendations are made:

1. Assign this committee definite functions and responsibilities or else drop it.

2. The history of war in our lifetime clearly indicates the need of adequate research and engineering programs during the intervals between hostilities. If the Armed Services are to control these activities, more of their members must be properly educated to control and direct them. We, as an Association, can help.

3. Many reserve officers and civilians who have seen service are willing, capable and able to assist in many ways, but not having been called upon are rapidly losing interest. The reserve training program for Chemical Corps officers needs a thorough examination. I refer to technically trained officers only.

4. The Service is to be congratulated upon the good relations it has established with one of the technical societies, but the Chemical Corps also needs the close aid and assistance of the several other professional and engineering societies. This needs further stimulation by both the Association and the Corps.

5. Let's help to secure a budget, personnel, and facilities to keep Research and Engineering going not on a lavish scale nor on too small a scale, but adequately, and let's help to recommend consultants.

At this time I would like to thank the several members of my committee, Dr. Albert Noyes, Jr., Mr. Mart Chittick, Mr. L. T. Sutherland, Dr. Franklin McLean and Dr. John Hutchison, and all others who have assisted us during the past year.

Respectfully submitted,

T. H. MARSHALL.

NAME CHANGE FOR CHEMICAL CORPS MAIN INSTALLATION

Army Chemical Center, Md.—The Army Chemical Center, Maryland, is the new official post office address of this installation.

Capt. Wm. G. MacFarlane, Post Adjutant, made the announcement of the change of name, effective 1 June, from Post Office, Edgewood Arsenal, Md., to Post Office, Army Chemical Center, Md.

The main telephone exchange for the post is now "Army Chemical Center 1000" instead of "Edgewood Arsenal 1000."

Comment caused by the report of the Research and Development Committee.

REMARKS OF MR. RALPH W. HUFFERD

Mr. President:

I would like to put in my two cent's worth at this point, and to change the subject slightly.

There are several implications in Ted Marshall's report that would bear amplification. I wish to speak on one of these, namely, aid to CW Research and Development by industrial technical men.

I doubt that many are closer to the wartime personnel of the Technical Division and Technical Command than I am. At the Atlantic City meeting of ACS this spring I listened to a lot of griping done by former officers, and was heard myself.

Former Technical officers, and I can speak intelligently only of the technical group, cannot understand why they have been so thoroughly cast aside on relief from active duty. They know that they have a wealth of experience and knowledge, but can't find a way of making their knowledge available to our Corps.

We have just heard emphasis on the subject of "big names." Anyone who has read the personal columns of the technical journals knows that many, yes, very many of our former officers are now in important industrial positions. In the not too distant future, many of them will be "big names." If at all possible, their interest and knowledge should be used, **now.** Before long, they may consider themselves too long out of harness to be of service.

I know that General Waitt and Colonel Loucks are troubled by the lack of a training plan and funds for training members of the ROC. Perhaps, they feel there must be compensation offered these technical reserve officers I refer to to get the benefit of their time and advice. If so, I cannot but feel that they are mistaken.

I need only to recall the devotion to their own preparation for a possible war and to national defense in general of many of the older reserve officers to make my point clear. For many of us our activities along these lines cost us both many dollars and much time during the interwar period. Of course, that goes for the war period, also. It is only too evident that these officers would hardly start to saving pennies at this late date.

My own experience with the new crop of reserve officers in my own chapter of ROA leaves me no room for question as to their sincerity and desire to be useful. Naturally, many of these are not in a position to travel and give their time without remuneration.

Those who would be most valuable would undoubtedly refuse to take a sixty or ninety day tour of active duty, or even a two weeks' tour, for that matter. But, were the request to be made, I have little doubt but that they would give a day or two occasionally to their Corps. Quite naturally, they would have to have timely notice and find their own schedules compatible with that of any proposed conference.

Can't these specialists be put to work?

Where does the CWA fit into the scheme?

11 June 1947

To the Editor
Chemical Corps Journal

DEAR SIR:

In reading Colonel Marshall's report on research and development, Colonel Sutherland made certain comments of his own in such a way that it was not always clear just what was comment and just what was subject matter of the report. The impression, so created, impelled the writer to object to certain statements which seemed to imply unwarranted reflection on the past and present performance of the Technical Command and were in conflict with the facts as understood by the writer from his long service as Chief Chemist of that organization.

It appeared to me that Colonels Marshall and Sutherland were unfamiliar with the solid record of accomplishment of the Chemical Corps in research and development between wars. They also appeared to be unfamiliar with many important elements of present organization and policy which now make the future of Chemical Corps research and development look so bright.

Just how the report will look in print, I do not know, for I have not seen a copy of it. But it may well be that the author of the report would wish to make some changes in it if he spent a day at Edgewood bringing himself up to date on the current situation.

Colonel Sutherland's earnest presentation of the report commanded attention. There is no question that he made a good point in calling attention to the heavy responsibility which rests on those in charge of the research and development program. But he may be sure that they are not unaware of that responsibility and are not taking it lightly.

DUNCAN MACRAE.

Bel Air, Md.
June 11, 1947

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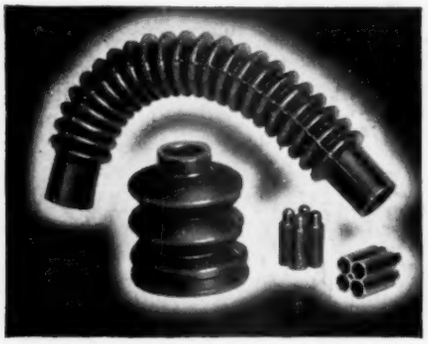

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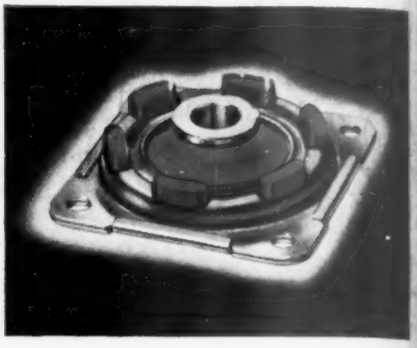

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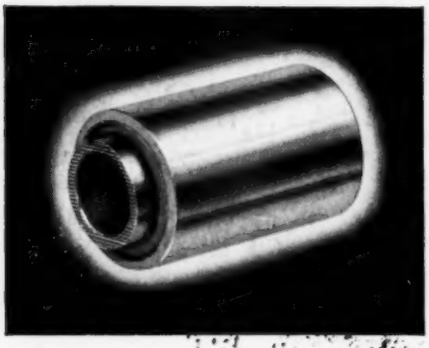

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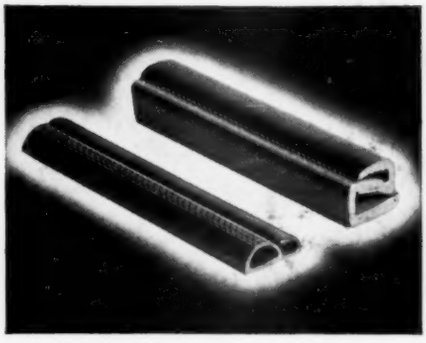

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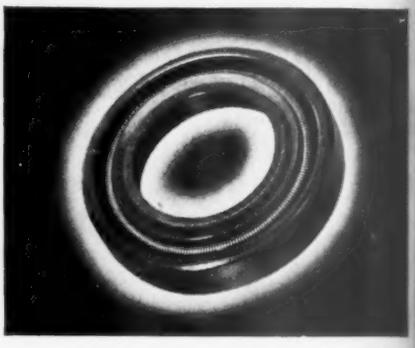

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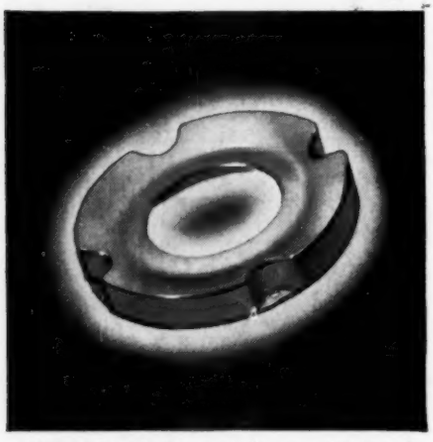

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